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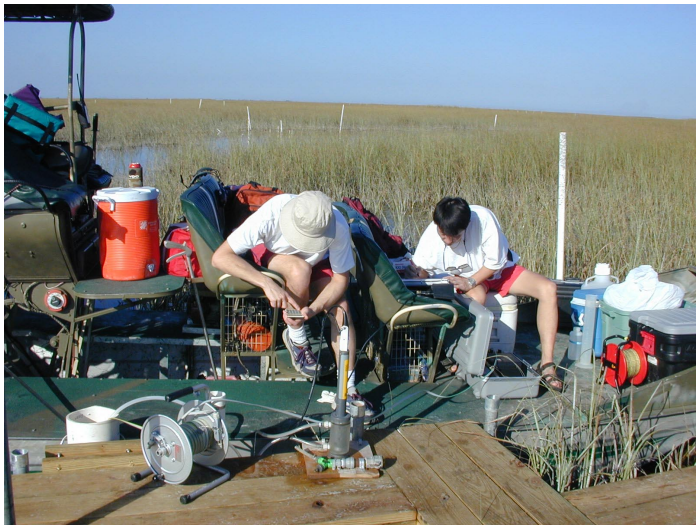
Interaction between Ground Water and Surface Water in Taylor Slough and Vicinity, Everglades National Park, South Florida: Study Methods and Appendixes

Open-File Report 00-483



Prepared as part of the
U.S. GEOLOGICAL SURVEY PLACE-BASED STUDIES PROGRAM

In cooperation with
EVERGLADES NATIONAL PARK

Interaction between Ground Water and Surface Water in Taylor Slough and Vicinity, Everglades National Park, South Florida: Study Methods and Appendixes

By Judson W. Harvey, Jonah M. Jackson, Robert H. Mooney, and Jungyill Choi

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U. S. DEPARTMENT OF THE INTERIOR
BRUCE BABBITT, *SECRETARY*

U. S. GEOLOGICAL SURVEY
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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 in Taylor Slough in Everglades National Park. Determining the extent of hydrologic interactions between wetland surface water and ground water in Taylor Slough is important because the balance of freshwater flow in the lower part of the Slough is uncertain. Although freshwater flows through Taylor Slough are quite small in comparison to Shark Slough (the larger of the two major sloughs in Everglades National Park), flows through Taylor Slough are especially important to the ecology of estuarine mangrove embayments of northeastern Florida Bay. Also, wetland and ground-water interactions must be quantified if their role in affecting water quality is to be determined.

In order to define basic hydrologic characteristics of the wetland, depth of wetland peat was mapped, and hydraulic conductivity and vertical hydraulic gradients in peat were determined. During specific time periods representing both wet and dry conditions in the area, the distribution of major ions, nutrients, and water stable isotopes throughout the slough were determined. The purpose of chemical measurements was to identify an environmental tracer could be used to quantify ground-water discharge.

INTRODUCTION

Management of the wetlands of the Florida Everglades for flood control and water supply is causing significant changes in their hydrology and ecology. 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 effects on vegetation, including the invasion of cattails and the disappearance of tree islands. 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 underway. The overall goal of the twenty-year plan is to restore pre-development conditions of surface water flow, including volume and depth of flow, and the duration of standing water (McPherson and Halley, 1996; Gerould and Higer, 1996).

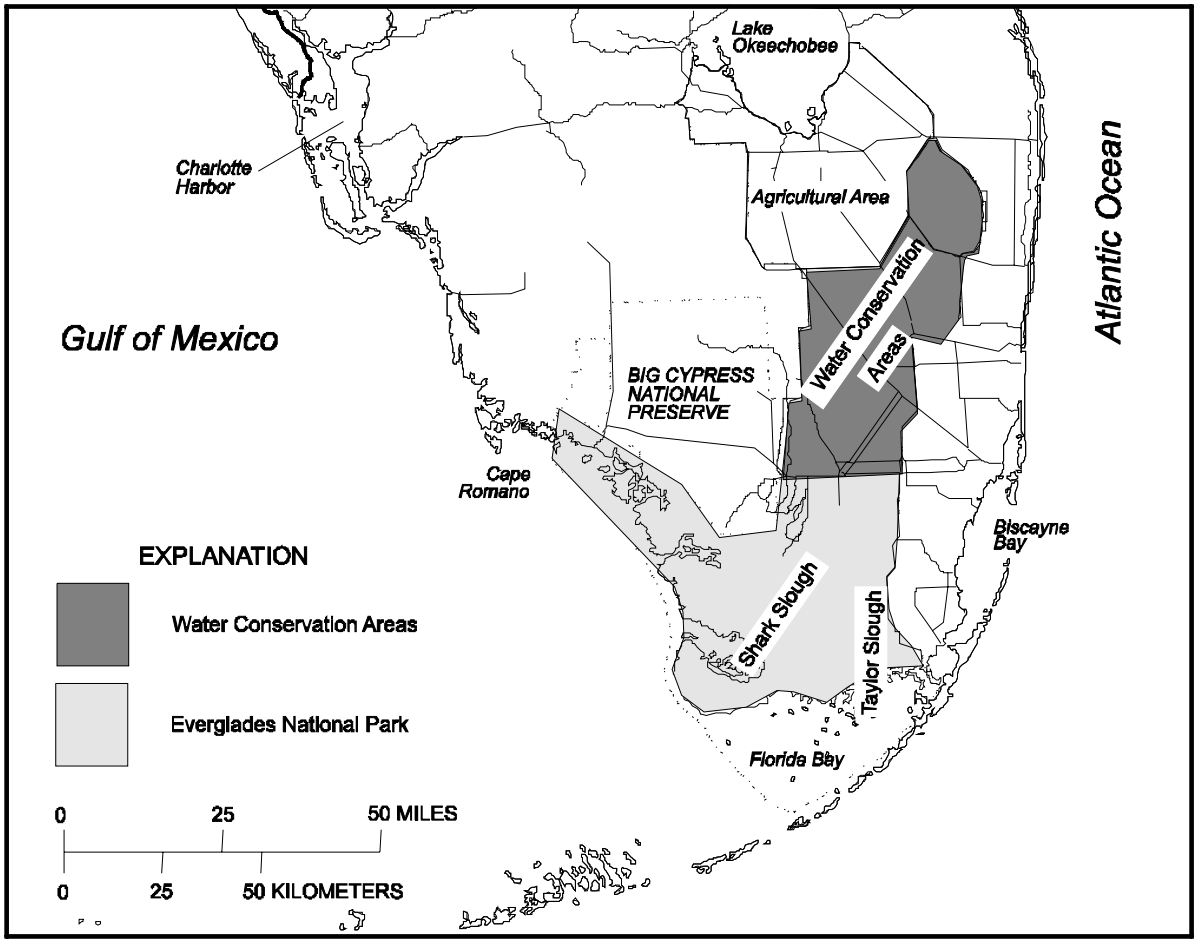

Figure 1. General location of study area in South Florida.

A key measure of success in restoring the Everglades is the restoration of more favorable surface-flow patterns and improvement or protection of water quality. Evaluating the success of the restoration efforts depends on reliable hydrologic and water–quality information collected prior to re-engineering. For example, information is needed about interactions between ground water and surface water to improve our understanding about how those interactions affect water budgets and water quality under restoration. In cooperation with National Park Service, the U.S. Geological Survey (USGS) has undertaken an investigation about interactions between surface water and ground water in Everglades National Park, as part of a larger effort to better understand surface-flow patterns and ecology of the park wetlands. The investigation was made possible by funding from the Department of Interior administered through the National Park Service (CESI Program), and the U.S. Geological Survey (Place-Based Studies Program).

The goals of this investigation were;

(1) to quantify hydrologic fluxes between surface water and ground water in Taylor Slough, and

(2) take an initial step toward determining the relative importance of geologic, anthropogenic, and climatic factors that control interactions between ground water and surface water in the Taylor Slough area.

Purpose and Scope of Report

The purpose of this report is to compile under one cover all of the data that were collected about interactions between ground water and surface water in the Taylor Slough area of Everglades National Park during the period between September 1997 and September 1999. In addition, the report contains a detailed description of the study sites, the methods used, and the basic results from hydraulic and geochemical sampling. Data interpretations are the subject of companion publications.

Acknowledgments

The assistance of several scientists from the USGS, University of Miami, and the South Florida Water Management District is gratefully acknowledged. Eugene Shinn and his project personnel at USGS in St. Petersburg Florida provided invaluable assistance by emplacing new ground water wells in the wetland interior of Taylor Slough that benefited this project. Rene' Price of the University of Miami shared her knowledge of the ground water system in Everglades National Park and helped us sample some of the ground water wells in the area. Steven Krupa and Cynthia Gefvert of SFWMD assisted us by loaning certain field equipment, such as GPS units and water quality sensors. Gefvert also provided valuable field assistance on several of the trips while she was employed by USGS. William Orem and his project personnel at USGS in Reston Virginia contributed his measurements of peat depth and also collaborated by analyzing all of the nutrient samples collected by this investigation. Mark Zucker and Clint Hittle and other project personnel at USGS in Miami collected the chemical samples from the coastal embayments for this investigation. Gordon Shupe and his project personnel at USGS in Reston accommodated our need for

precisely determined elevations of ground-water wells.

SITE DESCRIPTION AND RESEARCH APPROACH

The two major flow-ways for surface flow through wetlands in Everglades National Park are Shark Slough and Taylor Slough (Figure 1). Taylor Slough is separated from Shark Slough by a series of low-lying coastal ridges surrounded by relatively high-elevation wetlands referred to as the Rocky Glades (Figure 2). Historically, Taylor Slough received water from precipitation, surface overflow from Shark Slough, and possibly ground-water discharge from the coastal ridge systems. Presently, Taylor Slough receives much of its water from the L31-W canal at the S332 pumping structure (at what is effectively the northern terminus of Taylor Slough), and from outflow at the southern end of the L31-W canal.

Taylor Slough is underlain by organic wetland peat that varies in depth (0.2 – 2 m) and in the content of calcitic mud. Under the peat is a highly permeable sand and limestone aquifer (Biscayne aquifer). Hydrogeologic properties of the Biscayne aquifer are described by Fish and Stewart (1991). Merritt (1996) also summarized hydrogeologic properties of the Biscayne aquifer, but he did so within the context of understanding how interactions with surface water might affect seasonal patterns in surface and ground water levels in Everglades National Park. Merritt's report also contains the most recent comprehensive hydrogeologic modeling of ground water flow in Everglades National Park. A previous summary of water budgets and hydrologic modeling in Everglades National Park is given in Fennema and others (1994) and Parker and others (1955). There are also a number of detailed studies at specific locations within the study area. For example, Genereux and Guardiario (1998) used data from a drawdown experiment in the L31-W canal to determine hydraulic properties of different layers within the Biscayne aquifer, as well as the conductance of fine sediments controlling seepage from the aquifer to the canal. Recently, Nuttle and others (2000) quantified net discharge of freshwater to Florida Bay using salinity data in Florida Bay and estimates of precipitation and evapotranspiration. Their estimates indicate the possiblity of freshwater inputs to Taylor Slough south of Taylor Slough bridge. However, none of the previous studies explicitly quantified discharge or recharge in Taylor Slough.

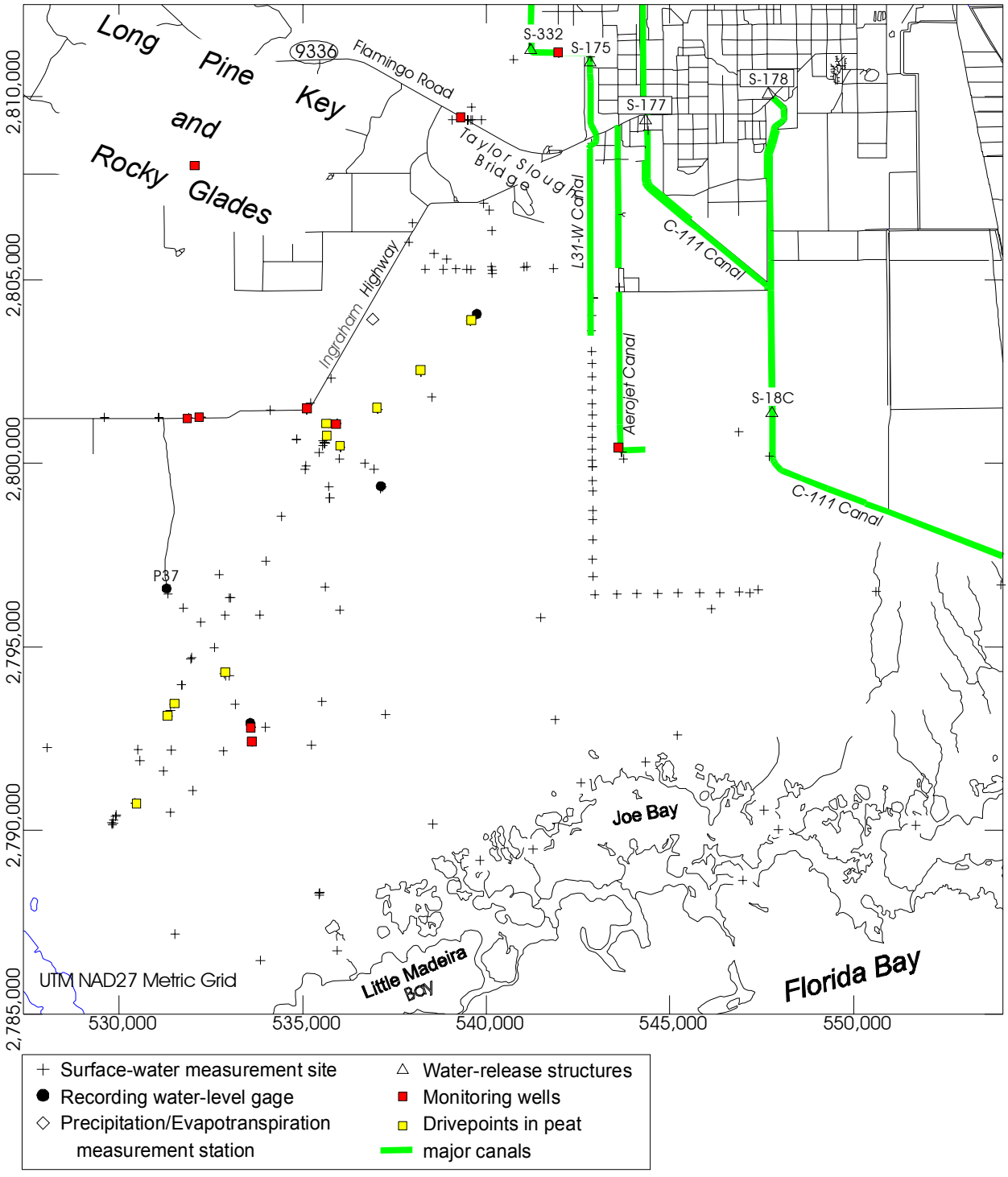

Figure 2. Data collection sites and selected features, Taylor Slough and vicinity.

STUDY METHODS

Horizontal Location Surveys

All wells and horizontal measuring points were surveyed by global positioning (GPS). The locations of measuring points are reported with reference to the North American Datum of 1927 (NAD 1927). That datum is a reference system that describes horizontal positions with reference to the size and shape of the earth. Using the Army Corps of Engineers program Corpscon, horizontal coordinates were transformed to Northings and Eastings in the Universal Transverse Mercator (UTM) coordinate system.

Horizontal positions were gathered using either a Trimble PRO XR GPS unit (model number 16787-10), a Rockwell PLGR unit (model HNV-560C), or a Garmin unit (various models). In all cases accuracy is expected to be better that plus or minus 100 feet, which was judged to be sufficient for our purposes.

Vertical Elevation Surveys

Vertical control points near or on wells were surveyed using GPS techniques by USGS/NMD personnel in October 1998. Elevations in the NAD88 datum were derived from the observed NAD83(97) ellipsoid heights and the NGS GEOID96 model. The estimated accuracy of derived elevations is ± 0.07 m. Further questions about surveying techniques should be directed to Gordon Shupe, USGS, Reston.

The elevations for vertical control points near wells were transferred to well top control points by Rene' Price, U. of Miami. At the suggestion of Robert Zepp, National Park Service, an offset of +0.45 m was applied to those elevations in order to convert the elevations to NGVD 1929 datum, which is considered appropriate for the Taylor Slough area.

Hydrologic Measurements

Water Levels, Water Depths, and Peat Depths

Surface water levels were recorded manually from existing staff gages that are located along the main north-south airboat trail in Taylor Slough. Water depths were either measured directly or they were calculated on the basis of staff-gage readings and water depths measured simultaneously on previous visits. Water levels in wells and drivepoint piezometers were also measured manually during those visits using an electric water level tape (Solinst model 15225 or similar equipment). Peat depths were determined by pushing a 3/8" rod downward through the peat to refusal.

Hydraulic Gradients and Hydraulic Conductivity in Peat

Vertical flow through the peat was characterized by measuring vertical hydraulic gradients and hydraulic conductivity in the peat. Hydraulic gradients were measured using drivepoint piezometers installed in the peat. The difference in water elevation within and outside the piezometer was determined, and that quantity was divided by the vertical distance between the center of the piezometer screen and the surface of the peat. Vertical hydraulic gradients were determined similarly using data from wells emplaced in the Biscayne aquifer. In a few cases the well screens were open to locations in the aquifer with much higher salinity compared with the surface water in Taylor Slough. In those cases no simple calculation of vertical hydraulic gradient was possible (Reilly, 1993).

Drivepoint piezometers were constructed of 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 by covering screens with a narrow sleeve that was lifted far enough to expose the screen after piezometer installation. Piezometers were revisited at a later time to measure equilibrium water levels and to perform bail tests.

Hydraulic conductivity of the wetland peat, *K*, was estimated from bail tests (also referred to as drawdown tests) in the drivepoint piezometers. Bail tests required a measurement of the equilibrium water level in the piezomter, after which water was pumped out of the piezometer and the rate of water-level recovery toward equilibrium measured. Hydraulic conductivity was calculated from water-level recovery data using the method presented by Luthin and Kirkham (1949). It must be noted that in a sediment with alternating layers of low and high *K*, that a bail test would be more likely to characterize horizontal *K*. The importance of layering in Taylor Slough peat on hydraulic properties is unknown, although experience in the northern Everglades suggests that bail-test estimates of vertical *K* compare favorably with estimates based on seepage-meter measurements (Harvey et al., 2000).

Water-Quality Sampling

Spatial and seasonal variation of water chemistry is often informative about interactions between surface water and ground water. For this study, sampling was conducted during seven primary measurement periods between September 1997 and September 1999. Field water-quality parameters that were measured included temperature, pH, specific conductivity, oxidation-reduction potential, and dissolved oxygen. In additon to samples for major-ion analysis, samples were collected for analysis of ammonium, phosphate, and the water stable isotopes deuterium (^{2}H) and oxygen-18.

Collection of Ground Water and Surface Water Samples

Prior to sampling wells the wells were purged by pumping with a centrifigal pump until three borehole volumes of water had been evacuated. For drivepoints, the water within the casing was purged completely and the drivepoint was allowed to refill slowly before the sample water was pumped.

Field measurements of basic water quality parameters were obtained in surface water by direct measurement with YSI sensors (models 610 DM or 610D handheld units attached to 600XL sondes). Ground-water samples were pumped through an enclosed flow cell with installed YSI sensors.

All water samples for chemical analysis were obtained using a peristaltic pump loaded with a single piece of tubing (25’ of Norprene Masterflex Size 15). For subsurface sampling the tubing was inserted to near the bottom of drivepoints or to the maximum depth possible (approximately 15 feet) in wells. For surface water sampling the placement of the sample tubing was approximately half the depth of the water. Care was taken to keep the tubing inlet suspended in the surface-water column above flocculent sediments. This was accomplished by inserting the tubing inside a PVC pipe with 0.01” slots at the tip, and

positioning the pipe so that the slots were at mid depth in the water column.

Sample Collection, Treatment, and Handling

Prior to fieldwork all equipment that could contact the water to be sampled was cleaned by scrubbing with Liquinox™, and rinsing with tap water. Sample bottles were precleaned as necessary by the vendor or by USGS personnel to meet USGS standards. For example, cation and nutrient bottles were precleaned with 10% dilute acid (HCL), rinsed with Milli-Q water, and dried before use. Both filtered and unfiltered samples were obtained at each site in the following order:

- Unfiltered samples, requiring no preservation (sample for ^{18}O and ^{2}H and raw sample for laboratory determination of specific conductivity),
- Filtered samples, requiring no preservation (anions),
- Filtered samples, requiring preservation (cations and nutrients),

New gloves were used and sample bottles rinsed before a sample was collected at a new surface water site or well. All sample bottles except for water stable isotopes were rinsed with sample water three times before filling. After collecting the unfiltered samples, a new 0.45 μm inline filter was placed on the outlet of the sampling tube before filling the remaining bottles. Cation samples were then preserved with 50% HNO_3 to a pH level less than 2.0. After preservation, all samples were stored in a cooler half to three-quarters filled with shaved ice. All nutrient samples were immediately placed in a freezer upon return from the field. Other samples were stored at room temperature until analysis.

Samples to be analyzed for major ions were delivered to the USGS Quality Water Service Unit (QWSU) in Ocala Florida after sampling was completed. Nutrient samples were shipped overnight to USGS in Reston Virginia on ice after sampling was completed. The Geologic Division's Biogeochemistry Laboratory (William Orem-chief) performed the analysis.

Major ions were analyzed by inductively coupled plasma optical emission spectroscopy (cations) and by ion chromatography (anions). More information about the analysis may be obtained directly from the USGS QWSU laboratory in Ocala Florida. Oxygen and hydrogen isotopic results are reported in per mill ($^{0}/_{00}$) relative to VSMOW (Vienna Standard Mean Ocean Water) and normalized relative to SLAP (Standard Light Antarctic Precipitation). The 2-σ uncertainty of oxygen and hydrogen results is 0.2 $^{0}/_{00}$ and 2 $^{0}/_{00}$, respectively. Results are based on actvities, not concentrations, which requires that corrections be made for brines. No corrections were made for the present samples. The Chief of the Isotope Fractionation Project at U.S. Geological Survey in Reston, VA should be consulted for more details of the stable isotope analyses. Ammonium and phosphate were analyzed by standard colorimetric analyses. The Chief of the Biogeochemistry Project in Geologic Division in Reston should be contacted for further information about nutrient analyses.

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APPENDIXES

APPENDIX I

Data Collection Sites and Hydrologic Characteristics of Peat: Taylor Slough and Vicinity, South Florida

Table I-1. Site Locations, Well and Drivepoint Information, and Peat Depths and Hydraulic Conductivities Page 1 of 5

Site ID	Site Type	Latitude	Longitude	NAD	Northing (meters, NAD27)	Easting (meters, NAD27)	Well Depth - Grd Surface to Well Screen Top (feet)	Screen Length (feet)	Well Top Elevation (feet) NGVD29	Approx. Height - Well Top above Grd. Surf. (feet)	Drive Pt. Depth - Ground Surface to Center Scr.	Drive Point Diam. (inches)	Peat Depth (feet)	Peat *K* (cm/s)
AEROJETCANAL	sw				2804810.00	543636.00								
C111-1	sw	25 19.141	80 31.558	27	2800197.80	547711.51							2	
C111-2	sw	25 16.891	80 32.507	27	2796039.86	546133.73							2.5	
C111-3	sw	25 15.029	80 33.065	27	2792600.38	545208.87							3	
C111-4	sw	25 19.109	80 33.929	27	2800125.25	543734.29							1	
C111-5	sw	25 16.77	80 35.28	27	2795801.47	541481.22							1.5	
C111-6	sw	25 15.26	80 35.05	27	2793015.96	541875.80							2.5	
C111-W	sw				2809080.00	544407.00								
C111-S18C	sw	25 19 30	80 32 03	27	2800857.44	546883.86								
CYP2(10')	gw	25 19 44.332	80 40 47.067	27	2801255.28	532231.35	5	5						
CYP2(100')	gw	25 19 44.209	80 40 59.315	27	2801250.68	531888.96	80	20						
CYP2-SW-N	sw	25 19 44.332	80 40 47.067	27	2801255.28	532231.35								
CYP2-SW-S	sw	25 19 44.332	80 40 47.067	27	2801255.28	532231.35								
CYP2-W1-N	sw	25 19 44.286	80 41 28.089	27	2801251.17	531084.54								
CYP2-W1-S	sw	25 19 44.286	80 41 28.089	27	2801251.17	531084.54								
CYP2-W2-N	sw	25 19 44.258	80 42 21.111	27	2801246.97	529602.25								
CYP2-W2-S	sw	25 19 44.258	80 42 21.111	27	2801246.97	529602.25								
E121	sw	25.3751867	80.6006875	83	2806349.45	540150.49							1.9	
E122	sw	25.3657515	80.6104359	83	2805301.75	539172.83								
E123	sw	25 21.91	80 36.39	27	2805281.77	539590.71								
E123-FW	sw	25 22 8.866	80 36 59.569	27	2805717.63	538578.60								
E123-NN	sw	25 21 54.946	80 36 27.876	27	2805292.04	539465.58							2.9	
E123-NW	sw	25 22 4.103	80 36 47.376	27	2805572.11	538919.78								
E124	sw	25.3662135	80.6008205	83	2805355.76	540140.08								
E124-D2	sw				2805176.07	540160.87								
E124-T1C	sw	25 21.906	80 36.050	27	2805276.07	540160.87							3.2	
E124-T1EC-U1E	sw	25 21.954	80 35.488	27	2805367.50	541103.00							2.9	
E124-T1WC-UWO	sw	25 21.920	80 37.139	27	2805296.59	538334.67								
E124-T1WF-U4W	sw	25 21.914	80 36.842	27	2805286.94	538832.74								
E125	sw	25.3661553	80.5919384	83	2805352.02	541033.73							4.5	
E126	sw	25.3657669	80.5839768	83	2805311.48	541834.88								
E127	sw	25.3528385	80.6065348	83	2803872.98	539569.53							2.6	
E127DP	dp	25 21.146	80 36.287	27	2803872.30	539767.59						1.25		
E128	sw	25.3404388	80.6200736	83	2802495.97	538211.16							8.1	
E128DP	dp	25.3404388	80.6200736	83	2802495.97	538211.16						1.25		
E129	sw	25.3312953	80.6316625	83	2801480.21	537047.75							3.5	
E129DP	dp	25.3312953	80.6316625	83	2801480.21	537047.75					103	1.25		9.9E-05
E130	sw	25.3277449	80.6449907	83	2801083.43	535707.47							6.2	
E130-10	gw	25 19.649	80 38.577	27	2801098.79	535934.51	7.5	2.5	5.85	2.5				
E130-52	gw	25 19.649	80 38.577	27	2801098.79	535934.51	47.5	5	5.571	2.5				
E130DP	dp	25 19.640	80 38.711	27	2801081.58	535709.78					142	1.25		2.2E-04
E131	sw	25.3219812	80.6418327	83	2800446.04	536027.00							5.4	
E131DP	dp	25.3219812	80.6418327	83	2800446.04	536027.00					214	1.25		2.7E-04

Table I-1. Site Locations, Well and Drivepoint Information, and Peat Depths and Hydraulic Conductivities Page 2 of 5

Site ID	Site Type	Latitude	Longitude	NAD	Northing (meters, NAD27)	Easting (meters, NAD27)	Well Depth - Grd Surface to Well Screen Top (feet)	Screen Length (feet)	Well Top Elevation (feet) NGVD29	Approx. Height - Well Top above Grd. Surf. (feet)	Drive Pt. Depth - Ground Surface to Center Scr. (cm)	Drive Point Diam. (inches)	Peat Depth (feet)	Peat *K* (cm/s)
E131-S	sw	25 18 32.711	80 38 41.967	27	2799061.15	535734.51							6.7	
E131-SP	sw	25 18 32.709	80 38 41.957	27	2799061.09	535734.79							8	
E132	sw	25.3179508	80.635249	83	2800001.53	536690.84								
E133	sw	25 18 41.074	80 37 52.365	27	2799322.13	537120.71							1	
E133(RC-FE)	sw	25 18 41.074	80 37 52.365	27	2799322.13	537120.71								
E135	sw	25.3165259	80.6514539	83	2799839.40	535060.24							4.7	
E135-U*	sw	25 19.02	80 39.08	27	2799935.75	535093.80								
E136	sw	25.3050278	80.6578928	83	2798564.50	534415.42							5.1	
E137	sw	25.2939606	80.6620375	83	2797337.93	534001.31							3.4	
E138	sw	25.2849716	80.6715996	83	2796340.15	533041.15							2.3	
E138X	sw	25.2849496	80.6720242	83	2796337.61	532998.41								
E141	sw	25.2825538	80.6843864	83	2796069.33	531754.45							2.6	
E142	sw	25.2790332	80.6797633	83	2795680.59	532220.83								
E143	sw	25 16.344	80 40.577	27	2794990.92	532594.45							2.1	
E144	sw	25.265772	80.673051	83	2794213.77	532900.21							4.3	
E144DP	dp	25 15.954	80 40.417	27	2794271.83	532864.71						1.25		
E144-E1	sw				2794213.77	533000.21							2.3	
E145	sw	25.2587808	80.6704783	83	2793440.25	533161.17							3	
E146	sw	25 15.164	80 39.988	27	2792815.67	533588.29							2	
E146-15	gw	25 15.164	80 39.988	27	2792815.67	533588.29	12.5	2.5	3.336	2.5				
E146-25	gw	25 15.164	80 39.988	27	2792815.67	533588.29	22.5	2.5	3.851	3.5				
E146-27.5	gw	25 14.948	80 39.974	27	2792417.11	533612.78	25	27.5	4.97	4.5				
E146DP	dp	25 15.164	80 39.988	27	2792815.67	533588.29					52	0.75		5.0E-04
E147	sw	25.2699451	80.6824908	83	2794673.58	531948.61							5.5	
E147-U1	sw				2794716	531974							1.9	
E148	sw	25.2573002	80.6879939	83	2793272.08	531397.77							4.1	
E148DP	dp	25 15.790	80 41.113	27	2793966.38	531697.36					221	1.25		1.5E-03
E148-U2	sw	25 15.790	80 41.113	27	2793966.38	531697.36							6.9	
E148-U4	sw				2793445	531498							5.9	
E149	sw	25.2424062	80.6899338	83	2791622.37	531206.23							2.4	
E151(CP)	sw	25 13 44.002	80 42 14.517	27	2790210.21	529802.46							2.9	
E151(CP)NEARWELL	sw	25 13.757	80 42.247	27	2790166.61	529811.04								
E151DP	dp	25 14.048	80 41.867	27	2790748.66	530439.18					211	0.75	2.8	6.4E-04
E151-U2	sw				2790297	529852							2	
E151-U4	sw				2790383	529902							2.3	
E151-U5	sw				2790427	529927							2.3	
EW-23	sw	25 17 8.21	80 34 1.77	83	2796441.14	543555.70								
EW-24	sw	25 17 8.61	80 33 42.1	83	2796455.23	544105.75								
EW-25	sw	25 17 8.63	80 33 21.83	83	2796457.71	544672.61								

Table I-1. Site Locations, Well and Drivepoint Information, and Peat Depths and Hydraulic Conductivities Page 3 of 5

Site ID	Site Type	Latitude	Longitude	NAD	Northing (meters, NAD27)	Easting (meters, NAD27)	Well Depth - Grd Surface to Well Screen Top (feet)	Screen Length (feet)	Well Top Elevation (feet) NGVD29	Approx. Height - Well Top above Grd. Surf. (feet)	Drive Pt. Depth - Ground Surface to Center Scr. (cm)	Drive Point Diam. (inches)	Peat Depth (feet)	Peat *K* (cm/s)
EW-26	sw	25 17 9	80 33 2	83	2796470.94	545227.13								
EW-27	sw	25 17.15	80 32.68333	83	2796472.92	545814.42								
EW-28	sw	25 17 9.04	80 32 21.25	83	2796476.04	546366.73								
EW-29	sw	25 17 9.88	80 32 2.56	83	2796503.69	546889.32								
EW-29-1	sw	5 17.1471667	30 31.8726667	83	2796472.38	547174.68								
EW-29-2	sw	25 17 11.75	80 31 44.13	83	2796563.01	547404.52								
EW-29-4	sw	25 17 9.58	80 29 49.09	83	2796507.95	550621.93								
EW-TRAN-HARRY	sw	25 17 15.2	80 27 47.5	83	2796694.01	554021.61								
G3318TW	gw	25 23.46175	30 40.8815667	27	2808125.48	532052.09	220	3	5.9	0.2				
G3318C	gw	25 23.46175	30 40.8815667	27	2808125.48	532052.09	158	3	6.726	0.2				
G3318B	gw	25 23.46175	30 40.8815667	27	2808125.48	532052.09	74	3	6.3	0.2				
G3318A	gw	25 23.46175	30 40.8815667	27	2808125.48	532052.09	23	3	6.975	0.2				
G3318-ROAD-NSIDE	sw	25 23 19.991	80 40 44.103	27	2807888.80	532298.30								
G3318-ROAD-SSIDE	sw	25 23 19.991	80 40 44.103	27	2807888.80	532298.30								
G3337(100'-85')	gw	25 19 12.643	80 33 57.213	27	2800312.84	543692.50								
G3337SW	sw	25 19 12.643	80 33 57.213	27	2800312.84	543692.50								
IH-E	sw	25 22 36.132	80 37 20.445	27	2806554.64	537992.81								
IH-W-Ditch	sw	25 22 19.154	80 37 24.302	27	2806032.11	537886.49								
Joe Bay 1E	sw	25 13 38	80 31 26	27	2790034.11	547956.70								
Joe Bay 2E	sw	25 13 55	80 31 40	27	2790555.62	547563.14								
Joe Bay 5C	sw	25 14 38	80 33 35	27	2791867.30	544341.26								
Joe Bay 6W	sw	25 14 20	80 34 38	27	2791307.99	542580.52								
Joe Bay 8W	sw	25 13 21	80 35 25	27	2789489.19	541271.14								
L31SOUTHSIDE	sw				2808730	542877								
L31W-14	gw	25 25 06.248	80 34 57.470	27	2811183.90	541973.86	11	3	10.433	4.6				
L31W-40	gw	25 25 06.236	80 34 57.574	27	2811183.52	541970.96	39	3	13.068	4.6				
L31W-G3319TW	gw	25 25 5.792	80 34 27.915	27	2811172.48	542799.55	237	3	11.569	4.6				
L31W-S332HW	sw	25 25 16.640	80 35 25.874	27	2811501.09	541179.40								
L31W-S332TW	sw	25 25 16.640	80 35 25.874	27	2811501.09	541179.40								
L31WSOUTHEND	sw	5 21.5096667	80 34.398	83	2804509.55	542911.64								
M-12-M6E	sw	25 19.126	80 38.536	27	2800133.78	536005.86							1.7	
M1E	sw	25 18.707	80 37.845	27	2799363.66	537167.15								
M1W	sw	25 19.414	80 39.237	27	2800662.19	534828.55								
M1W-A	sw	25 19.414	80 39.237	27	2800662.19	534828.55								
M3W-Trans2	sw	25 19.39	80 38.81	27	2800619.77	535544.94								
NP37	sw	25 17 8.088	80 41 19.742	27	2796447.34	531329.04							2.2	
NP67(20')	gw	25 19.85	80 39.07	27	2801467.56	535106.59	19	1	3.41	4.6				
NP67-200mNorth	sw				2801641	535207								
NP67-CUL	sw	25 19.85	80 39.07	27	2801467.56	535106.59								
NP67-N	sw	25 19.85	80 39.07	27	2801467.56	535106.59								
NP67-S	sw	25 19.85	80 39.07	27	2801467.56	535106.59								

Table I-1. Site Locations, Well and Drivepoint Information, and Peat Depths and Hydraulic Conductivities Page 4 of 5

Site ID	Site Type	Latitude	Longitude	NAD	Northing (meters, NAD27)	Easting (meters, NAD27)	Well Depth - Grd Surface to Well Screen Top (feet)	Screen Length (feet)	Well Top Elevation (feet) NGVD29	Approx. Height - Well Top above Grd. Surf. (feet)	Drive Pt. Depth - Ground Surface to Center Scr. (cm)	Drive Point Diam. (inches)	Peat Depth (feet)	Peat *K* (cm/s)
NS-1	sw	5 21.5096667	80 34.398	83	2804509.55	542911.64								
NS-10	sw	5 19.6146667	80 34.4233333	83	2801012.04	542880.31								
NS-11	sw	25 19 27.12	80 34 25.39	83	2800711.83	542881.55								
NS-12	sw	25 19 16.84	80 34 25.31	83	2800395.63	542884.79								
NS-13	sw	25 19 6.92	80 34 25.46	83	2800090.48	542881.57								
NS-14	sw	25 19 1.37	80 34 25.13	83	2799919.79	542891.34								
NS-14BACKUP	sw	5 19.0228333	80 34.4188333	83	2799919.79	542891.34								
NS-15	sw	25 18 48.87	80 34 25.2	83	2799535.29	542890.61								
NS-16	sw	25 18 39.43	80 34 24.97	83	2799244.94	542897.96								
NS-17	sw	5 18.3778333	80 34.4176667	83	2798729.40	542897.09								
NS-18	sw	25 18 14.14	80 34 24.9	83	2798467.04	542902.40								
NS-19	sw	25 17 56.69	80 34 25.1	83	2797930.27	542898.52								
NS-1BACKUP	sw	5 21.5096667	80 34.398	83	2804509.55	542911.64								
NS-2	sw	25 21 15	80 34 25.22	83	2804030.19	542875.72								
NS-20	sw	25 17 39.1	80 34 25.46	83	2797389.18	542890.17								
NS-21	sw	25 17 23.97	80 34 24.95	83	2796923.83	542905.92								
NS-22	sw	5 17.1318333	80 34.3856667	83	2796429.99	542958.11								
NS-3	sw	25 21 1.84	80 34 25.71	83	2803625.35	542863.32								
NS-4	sw	25 20 43.23	80 34 25.34	83	2803052.95	542875.48								
NS-5	sw	5 20.5373333	80 34.42	83	2802714.91	542880.47								
NS-6	sw	25 20 21.02	80 34 25.22	83	2802369.79	542881.02								
NS-7	sw	25 20 9.45	80 34 25.25	83	2802013.89	542881.31								
NS-8	sw	25 19 56.68	80 34 25.37	83	2801621.08	542879.21								
NS-9	sw	25 19 46.91	80 34 25.01	83	2801320.59	542890.23								
NWOFE130NP67	sw				2801467.56	535106.59								
OLT-C	sw	25 14 49.768	80 41 16.782	27	2792193.09	531421.71							1.5	
OLTCDP-U2	dp	25 15 20.136	80 41 20.185	27	2793126.93	531324.35						1.25	4.3	
OLTC-U2	sw	25 15 20.136	80 41 20.185	27	2793126.93	531324.35								
OLT-E	sw	25 13 44.867	80 42 13.361	27	2790193.29	529843.32								
OLT-FE	sw	25 15 18.584	80 30 19.647	27	2793134.61	549801.86								
OLT-MidEast	sw	25 15.540	80 38.832	27	2793514.53	535526.72								
OLT-MW	sw	25 14.869	80 43.294	27	2792258.62	528040.57							2.5	
OLT-MW2	sw	25 14 40.503	80 41 47.408	27	2791906.15	530565.60								
OLT-NearEast	sw	25 14.811	80 40.437	27	2792162.37	532836.26							2.3	
OLT-NW	sw	25 14.84	80 41.82	27	2792210.45	530514.78							4.3	
PineRMP	sw	25 22 53.13	80 36 10.986	27	2807083.09	539932.31								
RC-1stMarkPast	sw				2800478	535547							5.5	
RC-3rdMarkPast	sw				2800305	535447							5.2	
RC-DP	dp	25 19.42	80 38.75	27	2800675.40	535645.44					135	1.25		3.9E-04
RC-EastEnd	sw	25 18 58.26	80 37 58.532	27	2799850.27	536946.83							6	
RC-nearE130	sw	25 19.360	80 38.779	27	2800564.54	535597.08							5.1	

Table 1. Site Locations, Well and Drivepoint Information, and Peat Depths and Hydraulic Conductivities Page 5 of 5

Site ID	Site Type	Latitude	Longitude	NAD	Northing (meters, NAD27)	Easting (meters, NAD27)	Well Depth - Grd Surface to Well Screen Top (feet)	Screen Length (feet)	Well Top Elevation (feet) NGVD29	Approx. Height - Well Top above Grd. Surf. (feet)	Drive Pt. Depth - Ground Surface to Center Scr. (cm)	Drive Point Diam. (inches)	Peat Depth (feet)	Peat *K* (cm/s)
RC-nearE130-BOT	sw	25 19.360	80 38.779	27	2800564.54	535597.08								
RC-nearE130-TOP	sw	25 19.360	80 38.779	27	2800564.54	535597.08								
S-175	sw	25 25 2.590	80 34 26.205	27	2811074.14	542847.64								
Stillwater Creek	sw	25 13 41	80 29 12	27	2790140.19	551705.65								
TC1A	sw	25 11.863	80 38.595	27	2786729.77	535942.50							4.3	
TC2	sw	25 12.709	80 38.889	27	2788289.74	535444.74							4	
TC3	sw	25 12.722	80 38.877	27	2788313.78	535464.82							3.3	
Trout Creek	sw	25 12 53	80 32 01	27	2788646.56	546982.21								
TS1	sw	25 25.01	80 35.688	27	2811006.40	540750.53							1.5	
TS10	sw	25 13.91	80 41.297	27	2790496.17	531396.61							2.8	
TS11	sw	25 14.898	80 39.006	27	2792328.97	535237.78							2.5	
TS12	sw	25 15.347	80 37.803	27	2793163.00	537254.71							3.5	
TS13	sw	25 13.726	80 37.044	27	2790175.04	538537.13							4.5	
TS14	sw	25 12.778	80 44.184	27	2788396.73	526554.29							3.5	
TS15	sw	25 12.111	80 41.227	27	2787176.45	531521.85							4	
TS16	sw	25 11.722	80 39.842	27	2786464.17	533849.22							4.8	
TS17	sw	25 13.191	80 36.279	27	2789191.43	539824.28							3.5	
TS2	sw	25 24.306	80 36.377	27	2809703.70	539599.48							1	
TS3	sw	25 22.785	80 36.09	27	2806898.08	540088.96							2.3	
TS4	sw	25 20.31	80 38.67	27	2802318.25	535775.27							2	
TS5	sw	25 20.03	80 37.04	27	2801809.05	538510.66							4.7	
TS6	sw	25 18.713	80 38.71	27	2799370.81	535715.99							6.3	
TS7	sw	25 17.231	80 38.78	27	2796635.48	535605.77							7	
TS7W	sw	25 17.419	80 40.496	27	2796975.15	532725.58							2.3	
TS8	sw	25 16.82	80 39.84	27	2795872.41	533829.05							4	
TS8E	sw	25 16.89	80 38.54	27	2796007.23	536010.16							5	
TS8W	sw	25 16.82	80 40.40	27	2795870.09	532889.35							2.5	
TS9	sw	25 14.23	80 40.936	27	2791088.14	532001.23							2.8	
TSB(15')	gw	25 24.12	80 36.45	27	2809360.07	539478.12	12	3	5.771	0				
TSB(34')	gw	25 24.12	80 36.45	27	2809360.07	539478.12	29	5	5.814	0				
TSB(57')	gw	25 24.12	80 36.45	27	2809360.07	539478.12	52	5	5.896	0				
TSB-2ndPipeCulE	sw				2809360.07	539578.12								
TSB-3rdPipeCulE	sw				2809360.07	539628.12								
TSB-EBC(BoxCulvert)	sw				2809360.07	539878.12								
TSB-S	sw	25 24.12	80 36.45	27	2809360.07	539478.12								
TSB-UE	sw	25 24.12	80 36.45	27	2809360.07	539478.12								
TSB-UM	sw	25 24.12	80 36.45	27	2809360.07	539478.12								
TSB-UW	sw	25 24.12	80 36.45	27	2809360.07	539478.12								
TSB-WBC(BoxCulvert)	sw				2809360.07	539078.12								
Upstream Taylor River	sw	25 12 41	80 38 53		2788242.39	535454.38								
West Highway Creek	sw	25 14 33	80 26 50	27	2791755.38	555672.20								

* Elevations of wells at TSB, L31W, E146, and G3337 sites were derived by GPS methods by USGS personnel using the GEOID96 model. Those results were originally reported by Gordon Shupe, USGS in the NAVD 88 datum but are reported here in the NGVD 29 datum through an approximate conversion (addition of 0.45 m) provided by Robert Zepp, ENP.

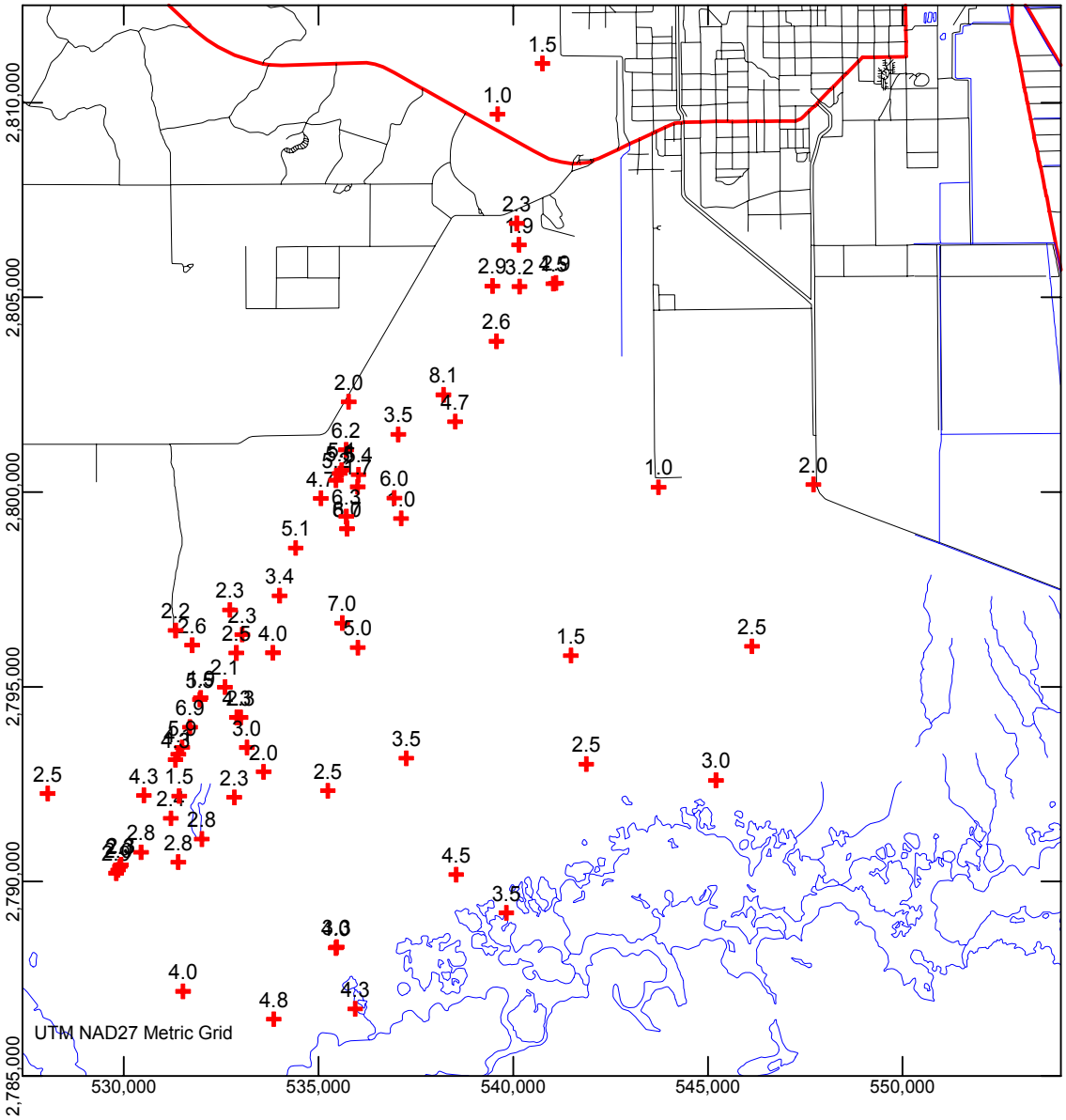

Figure I-1. Peat depth (feet) in Taylor Slough and vicinity.

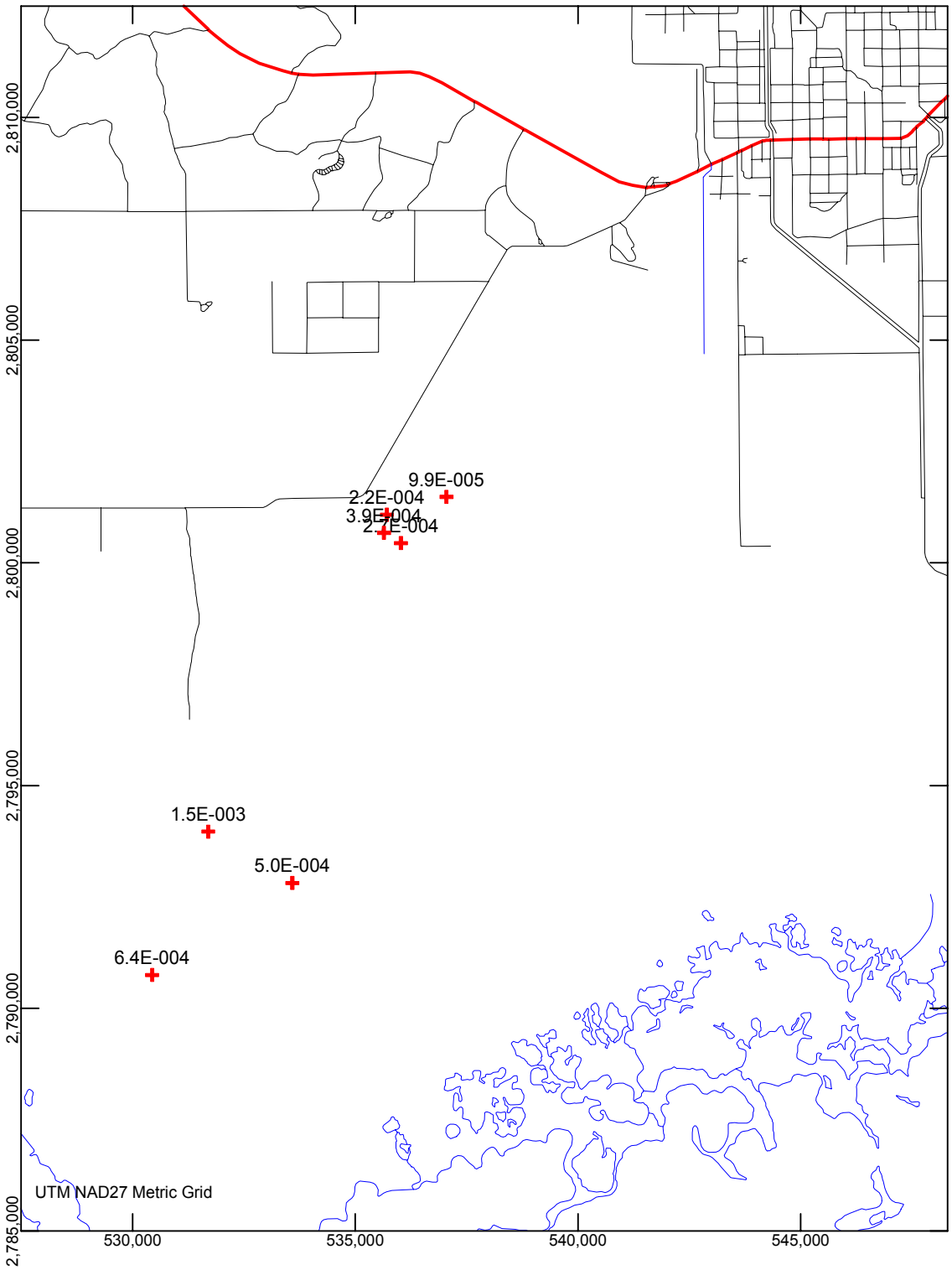

Figure I-2. Hydraulic conductivity of peat (centimeter/second) in Taylor Slough. Computations were made using head data collected in November 1997.

APPENDIX II

Data Collected in Taylor Slough and Vicinity between

September 22 and October 2, 1997

Table II-1. Chemical Analyses From Research Site Locations: September 22-October 2, 1997

Site ID	Site Type	Date	Field Parameters					Lab Spec. Cond. (µS)	Color (Pt/CO)	Ca (mg/L)	Na (mg/L)	Mg (mg/L)	SiO2 (mg/L)	Cl (mg/L)	Alk. as CaCO3 (mg/L)	SO4 (mg/L)	Br (mg/L)	Cation/ Anion Balance* (%)	Ammonium (µM)	Phosphate (µM)	δ^2H (‰)	$\delta^{18}O$ (‰)
			Temp. (°C)	pH	DO (mg/L)	ORP (mV)	Spec. Cond. (µS)															
								M.D.L.		0.02	0.1	0.001	0.01	0.1	1	0.2	0.05		0.05	0.05		
CYP2(10')	gw	9/25/97 12:44	29.5	7.44	0.15		258	296		50	7.2	2	3.0	13		0.2	0.05		16.6	0.063	-3.6	-0.63
CYP2-SW-S	sw	9/25/97 0:00	29.5	7.65			184															
E124-T1C	sw	9/22/97 17:11	29.0	7.36	5.65		386	384		51	20	5	4.4	32		2.4	0.05		0.49	0.05		
E131	sw	9/22/97 16:08	30.0	7.5	5.6		270															
E135-U*	sw	9/22/97 0:00	31.3	7.26	5.54		265															
E136	sw	9/22/97 13:55	31.3	7.75	7.25		264															
E137	sw	9/22/97 0:00	32.0	7.7	7.6		272															
E138	sw	9/22/97 13:41	32.2	7.9	7.5		259															
E142	sw	9/22/97 13:34	31.5	7.58	6.72		302															
E151(CP)	sw	9/22/97 10:21	28.9	7.99	8.7		200	206		23	12	3	3.5	23		0.2	0.05		0.958	0.05	7.9	1.60
G3337(100'-85')	gw	10/2/97 11:01	25.1	7.58	0.2		491	559		64	36	5	17	87		5.4	0.31				-7.8	-1.80
NP67(20')	gw	9/25/97 13:50	29.0	7.39	0.5		401	446		89	8.7	3	3.8	15		0.2	0.08		36.9	0.162	-8.5	-1.76
OLT-NW	sw	9/22/97 12:30	28.9	7.13	5.74		279	272		37	12	3	3.5	24		0.2	0.05		0.677	0.05	3.5	0.62
RC-nearE130	sw	9/22/97 14:30	31.0	7.82	6.59		272	267		42	8.6	2	4.1	14		0.2	0.05		1.24	0.05	-1.0	-0.14
TSB-UE	sw	9/22/97 18:45	32.5	8.01	7.47		388	416		56	22	5	4.9	35		4.8	0.05		0.552	0.05	-1.1	-0.43
TSB-UM	sw	9/22/97 18:55	32.0	7.88	8.14		396															
TSB-UW	sw	9/26/97 18:50	32.2	7.8	7.83		388															

Blank cells indicate no sample, no measurement, no analysis or that the measurement was not applicable at that site.
Outlined 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 is calculated using milliequivalents as (cations-anions)/(cations+anions)*100.
Results below the minimum detection limit (M.D.L.) are listed as the M.D.L.

Table II-2. Water Levels and Hydraulic Gradients: September 22, 1997

Site ID	Site Type	Water Level Observation Date	Staff (feet)	Water Depth (feet)
E124	SW	9/22/97 17:11	2.74	2.4
E127	SW	9/22/97 16:21	3.15	1.7
E128	SW	9/22/97 16:15	3.06	2.17
E129	SW	9/22/97 16:09	2.96	1.97
E131	SW	9/22/97 16:08	2.83	2.46
E136	SW	9/22/97 13:55	2.47	1.76
E137	SW	9/22/97 0:00	2.28	1.46
E138	SW	9/22/97 13:41	2	1.32
E142	SW	9/22/97 13:34	1.42	0.87
E147	SW	9/22/97 13:30	1.72	1.46
E148	SW	9/22/97 13:25	1.7	1.55
E151(CP)	SW	9/22/97 10:21	1.78	1.38
OLT-MW	SW	9/22/97 12:30		1.4

Head difference = tapedown water level inside piezometer/well - tapedown water level outside piezometer/well. Reference is top of piezometer/well casing. Correction for bias: 0.3 cm added to inside tapedown if drivepoint diameter < 1.25".
Shaded cells indicate water depths that were calculated by applying an offset to staff data.
Outlined cells indicate the result was flagged (e.g. value excessively low or high, not in keeping with history, etc.) and is suspect.

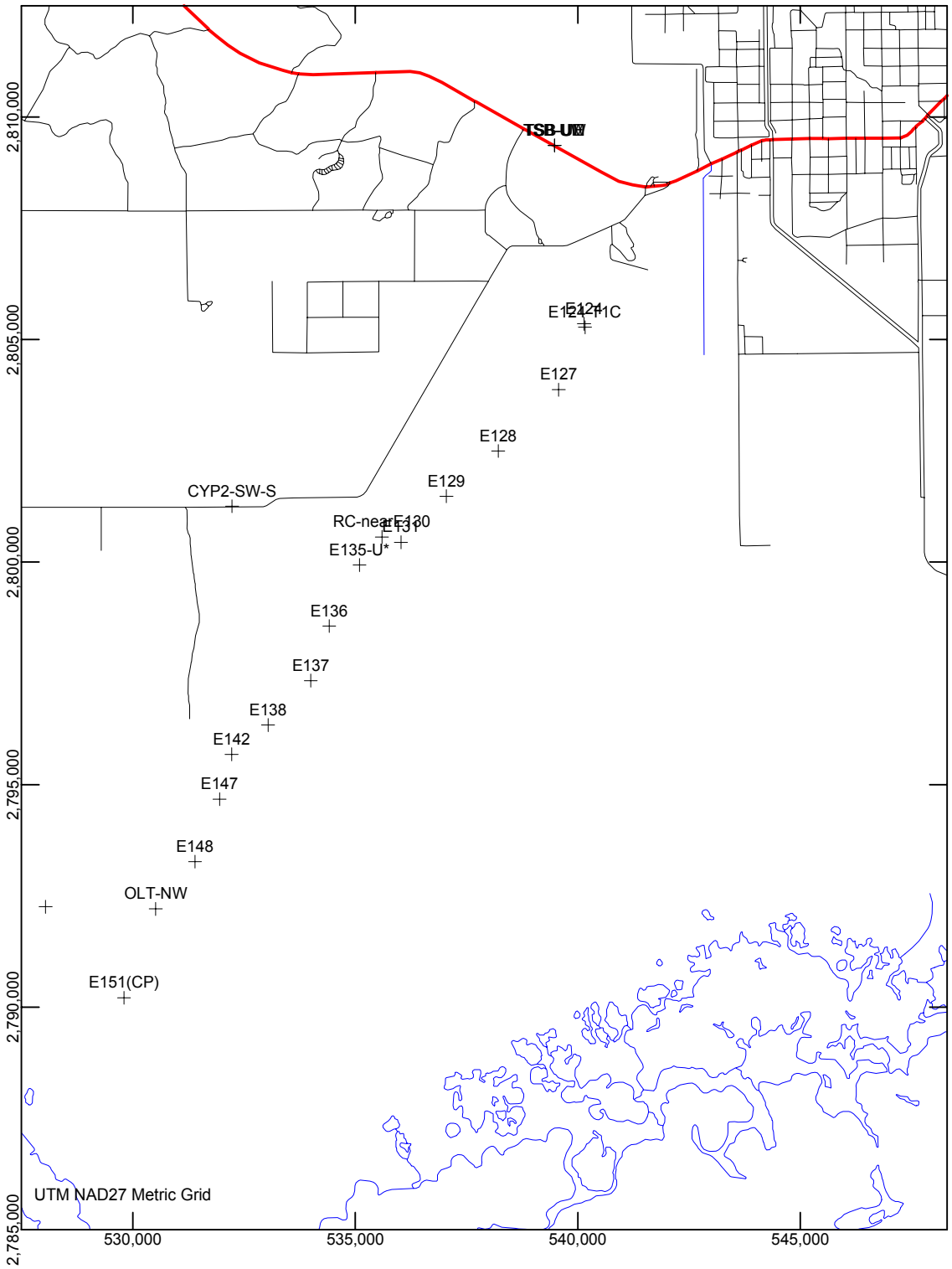

Figure II-1. Surface-water monitoring sites: September 22-October 2, 1997.

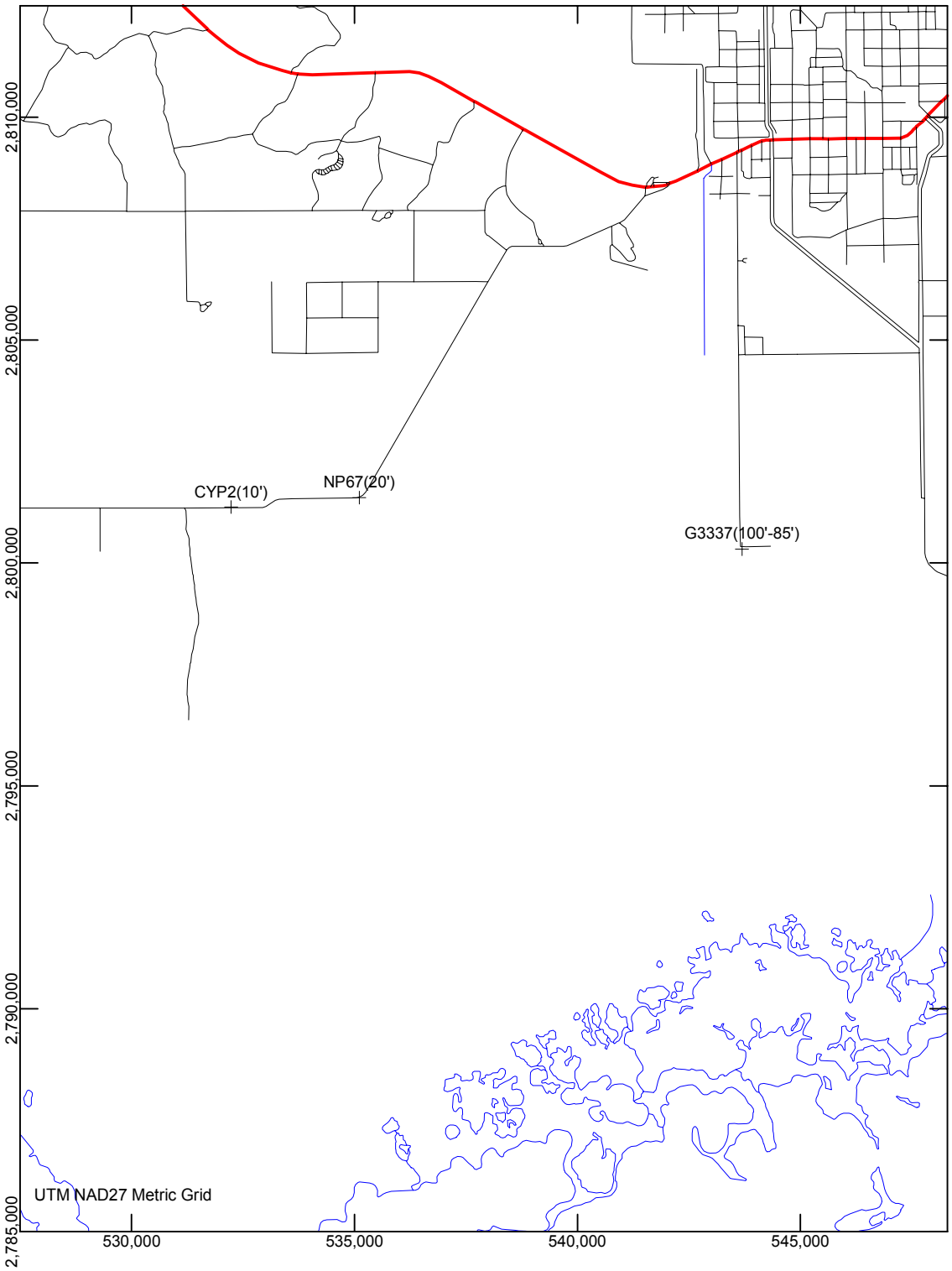

Figure II-2. Ground-water monitoring sites: September 22-October 2, 1997.

APPENDIX III

Data Collected in Taylor Slough and Vicinity on

November 10, 1997

Table III-1. Chemical Analyses From Research Site Locations: November 10, 1997

Site ID	Site Type	Date	Field Parameters					Lab Spec. Cond. (µS)	Color (Pt/CO)	Ca (mg/L)	Na (mg/L)	Mg (mg/L)	SiO2 (mg/L)	Cl (mg/L)	Alk. as CaCO3 (mg/L)	SO4 (mg/L)	Br (mg/L)	Cation/ Anion Balance* (%)	Ammonium (µM)	Phosphate (µM)	δ^2H (‰)	$\delta^{18}O$ (‰)
			Temp. (°C)	pH	DO (mg/L)	ORP (mV)	Spec. Cond. (µS)															
								M.D.L		0.02	0.1	0.001	0.01	0.1	1	0.2	0.05		0.05	0.05		
E129	sw	11/10/97 9:33	19.9				300															
E130(10')	gw	11/10/97 15:53	23.4				300															
E131	sw	11/10/97 9:43	20.0				300															
E135	sw	11/10/97 10:11	20.0				280															
E136	sw	11/10/97 10:21	21.6				280															
E137	sw	11/10/97 10:29	21.6				300															
E138	sw	11/10/97 10:38	22.4				310															
E138X	sw	11/10/97 10:44	21.8				330															
E142	sw	11/20/97 10:52	21.2				340															
E144	sw	11/10/97 13:11	25.5				290															
E146	sw	11/10/97 14:56	24.9				360															
E147	sw	11/10/97 10:57	21.2				310															
E148	sw	11/10/97 11:02	22.2				310															
E148-U2	sw	11/10/97 12:01	24.0				300															
E149	sw	11/10/97 11:45	22.2				330															
E151(CP)	sw	11/10/97 11:15	21.1				230															
E151-U4	sw	11/10/97 0:00	21.9				280															
E151-U5	sw	11/10/97 11:42	22.7				320															
OLTC-U2	sw	11/10/97 11:59	24.0				300															
RC-nearE130-TOP	sw	11/10/97 10:00	19.6				290															

Blank cells indicate no sample, no measurement, no analysis or that the measurement was not applicable at that site.
Outlined 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 is calculated using milliequivalents as (cations-anions)/(cations+anions)*100.
Results below the minimum detection limit (M.D.L.) are listed as the M.D.L.

Table III-2.: Water Levels and Hydraulic Gradients: November 10, 1997

Site ID	Site Type	Water Level Observation Date	Staff (feet)	Water Depth (feet)
E121	sw	11/10/97 16:56	2.56	0.8
E125	sw	11/10/97 9:02	2.05	
E127	sw	11/10/97 9:09	2.46	1.2
E128	sw	11/10/97 9:15	2.39	1.4
E129	sw	11/10/97 9:33	2.36	1.4
E130	sw	11/10/97 15:53	2.2	1
E131	sw	11/10/97 9:43	2.32	1.5
E135	sw	11/10/97 10:11	2.14	0.7
E136	sw	11/10/97 10:21	2.04	1.2
E137	sw	11/10/97 10:30	1.92	1.2
E138	sw	11/10/97 10:38	1.7	1
E138X	sw	11/10/97 10:40	1.65	
E142	sw	11/10/97 10:50	1.56	1.01
E144	sw	11/10/97 13:11	1.54	1
E144-E1	sw	11/10/97 13:11		1.6
E146	sw	11/10/97 14:56	1.38	1
E147	sw	11/10/97 10:57	1.38	1.2
E147-U1	sw	11/10/97 0:00		2
E148	sw	11/10/97 11:02	1.38	2.2
E148-U2	sw	11/10/97 0:00		1.3
E148-U4	sw	11/10/97 10:57		1.5
E149	sw	11/10/97 11:45	1.38	1.2
E151(CP)	sw	11/10/97 11:15	1.44	0.8
E151DP	dp	11/10/97 0:00		1.3
E151-U2	sw	11/10/97 0:00		1.6
E151-U4	sw	11/10/97 11:42		1.3
E151-U5	sw	11/10/97 11:45		1.3
NP37	sw	11/10/97 0:00		1.2
OLT-C	sw	11/10/97 11:54		1.3
OLTCDP-U2	dp	11/10/97 11:58		1.6
OLT-NW	sw	11/10/97 0:00		1.6
RC-1stMarkPast	sw	11/10/97 10:03		1.3
RC-3rdMarkPast	sw	11/10/97 10:06		1
RC-nearE130	sw	11/10/97 10:00		2.2

Head difference = tapedown water level inside piezometer/well - tapedown water level outside piezometer/well. Reference is top of piezometer/well casing. Correction for bias: 0.3 cm added to inside tapedown if drivepoint diameter < 1.25".
Shaded cells indicate water depths were calculated by applying an offset to staff data.
Outlined cells indicate the result was flagged (e.g. value excessively low or high, not in keeping with history, etc.) and is suspect.

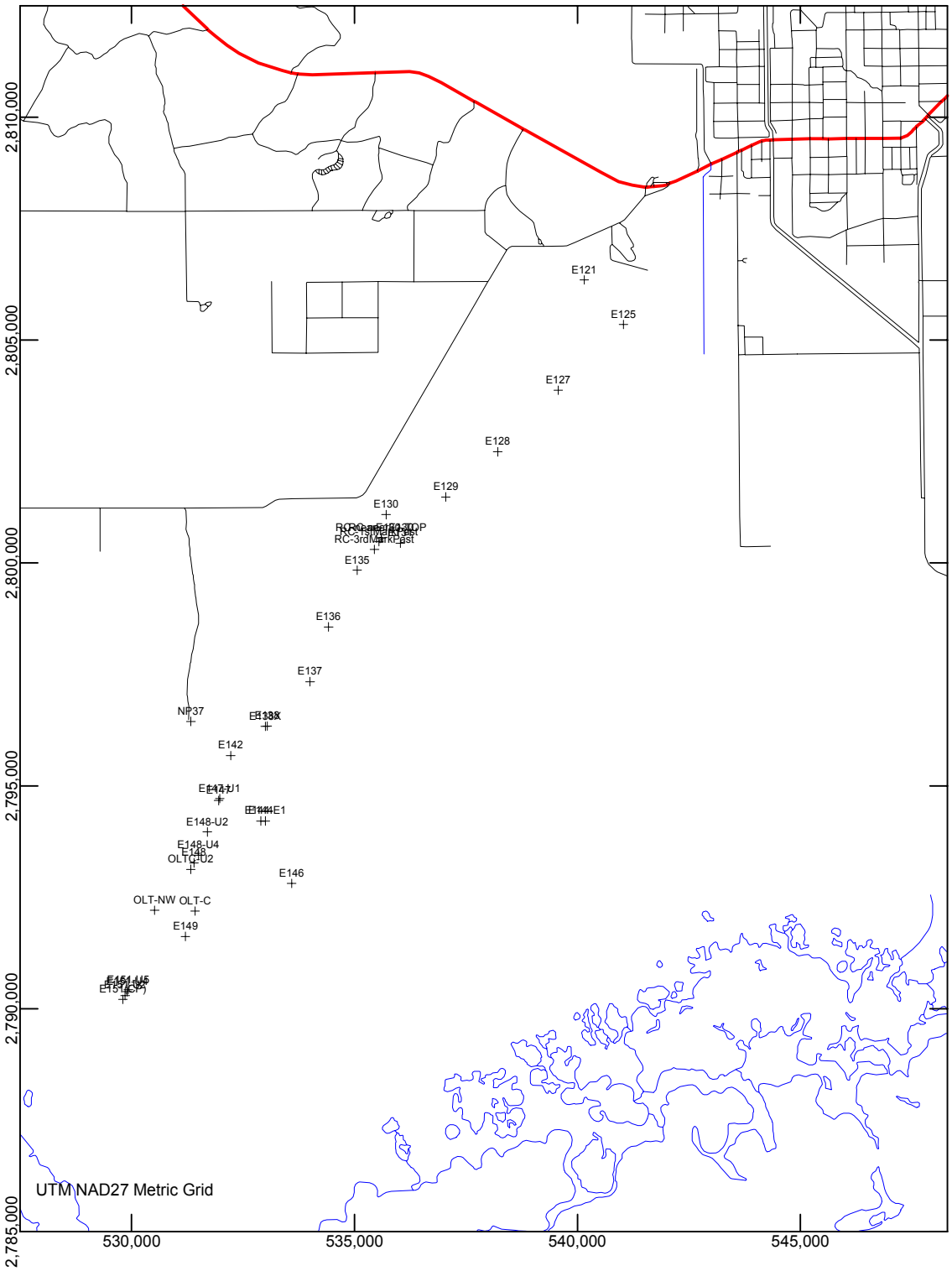

Figure III-1. Surface-water monitoring sites: November 10, 1997.

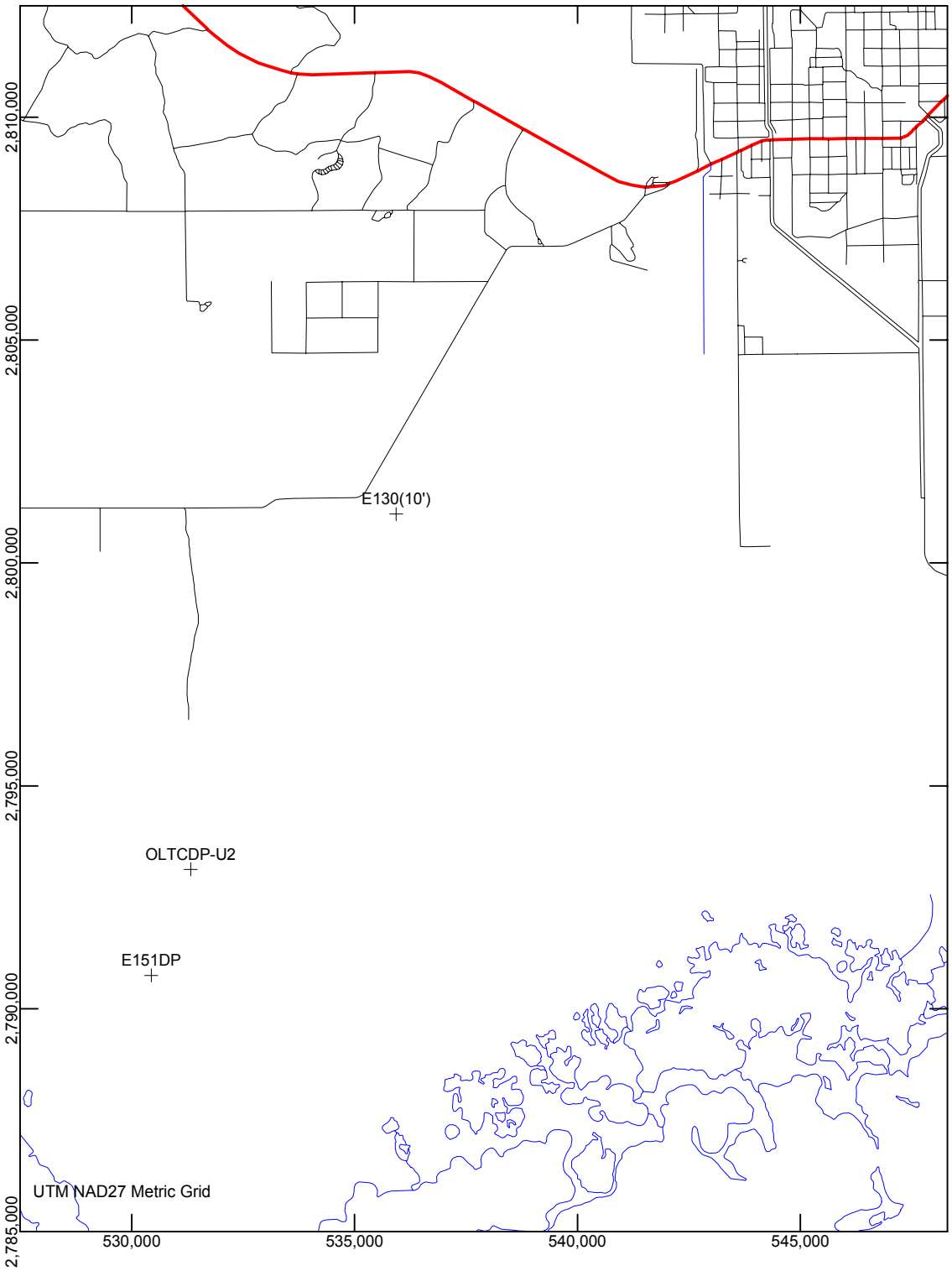

Figure III-2. Ground-water monitoring sites: November 10, 1997.

APPENDIX IV

Data Collected in Taylor Slough and Vicinity between

November 18 and 20, 1997

Table IV-1. Chemical Analyses From Research Site Locations: November 19-20, 1997

Site ID	Site Type	Date	Field Parameters					Lab Spec. Cond. (µS)	Color (Pt/CO)	Ca (mg/L)	Na (mg/L)	Mg (mg/L)	SiO2 (mg/L)	Cl (mg/L)	Alk. as CaCO3 (mg/L)	SO4 (mg/L)	Br (mg/L)	Cation/ Anion Balance* (%)	Ammonium (µM)	Phosphate (µM)	δ^2H (‰)	$\delta^{18}O$ (‰)
			Temp. (°C)	pH	DO (mg/L)	ORP (mV)	Spec. Cond. (µS)															
								M.D.L.		0.02	0.1	0.001	0.01	0.1	1	0.2	0.05		0.05	0.05		
E124-T1C	sw	11/19/97 8:03	19.6	7.2	3.26	206	461	463		66	22	5	4.2	35		0.76	0.07		0.74	0.05	0.4	-0.20
E124-T1EC-U1E	sw	11/19/97 9:57	20.0	7.43	3.37	30.3	458	460		63	25	6	4.2	40		1.2	0.05		1.86	0.05	7.6	0.98
E124-T1WC-UWO	sw	11/19/97 9:33	20.2	7.09	2.79	155.1	473	461		65	22	5	4.1	35		0.76	0.05		1.3	0.05	1.8	-0.08
E124-T1WF-U4W	sw	11/19/97 8:56	20.0	7.26	4.04	149.1	401	404		67	14	3	3.9	20		0.2	0.05		1.17	0.05	0.6	-0.21
E127	sw	11/19/97 10:40	20.1	7.46	4.76	87.6	453	454		66	23	5	4.3	37		0.8	0.05		2.95	0.05	5.6	0.59
E127DP	dp	11/19/97 11:14	23.9	6.67	2.97	20	916	890		180	22	8	3.5	25		0.31	0.13		12.5	0.12	5.1	0.65
E131	sw	11/20/97 9:00	20.5	7.25	4.73	174.6	351	364		59	11	3	2	16		0.2	0.05		3.22	0.05	7.9	1.06
E131DP	dp	11/20/97 14:23	24.9	7.08	7.84	-9.3	534	483		96	11	4	4.5	18		0.2	0.08		2.7	0.05	-2.6	-1.02
E141	sw	11/19/97 14:58	22.5	7.45	6.07	39.6	376	368		59	12	3	2.8	22		0.2	0.05		2.85	0.05	9.4	3.25
E142	sw	11/19/97 14:34	23.7	7.39	6.03	52.3	394	390		67	11	3	2.4	20		0.2	0.05		3.92	0.05	4.3	0.28
E146	sw	11/20/97 11:10	23.6	7.35	6.02	43.7	429	435		67	18	4	2.6	33		0.2	0.05		5.36	0.05	7.9	1.01
E151(CP)	sw	11/20/97 12:47	24.2	8.07	8.38	72	297	318		36	19	4	2.5	37		0.24	0.05		4.54	0.05	10.3	1.82
M-12-M6E	sw	11/19/97 11:27	21.0	7.27	4.38	37.2	432	427		67	16	4	2.5	25		0.2	0.05		2.4	0.05	7.1	1.04
M1E	sw	11/19/97 11:56	21.9	7.3	4.55	16.6	494	491		73	22	5	3.4	36		0.2	0.05		2.39	0.12	8.1	3.20
M1W	sw	11/19/97 13:30	22.0	7.54	7.08	49.9	391	391		67	10	3	2	17		0.2	0.05		7.21	0.11	2.3	0.06
M1W-A	sw	11/19/97 13:59	23.4	7.44	5.68	68.3	386	390		68	9.5	3	2.2	18		0.2	0.05		5.13	0.05	5.8	0.26
M3W-Trans2	sw	11/19/97 13:07	21.9	7.04	2.89	55.6	362	359		61	9.4	3	2.4	15		0.2	0.05		5.2	0.11		
NP37	sw	11/19/97 15:25	22.7	7.46	6.79	66.9	408	405		62	15	4	2.9	29		0.2	0.05		4.27	0.05	9.4	0.99
OLT-C	sw	11/20/97 11:48	24.4	7.57	6.02	54	375	381		55	16	4	2.5	28		0.2	0.05		2.39	0.12	8.2	1.35
OLT-MidEast	sw	11/20/97 10:36	21.5	7.39	5.25	103.9	410	420		66	16	4	2.8	27		0.2	0.05		3.74	0.11	5.8	0.78
OLT-MW	sw	11/20/97 12:03	21.7	7.66	8.92	50.4	291	291		37	15	4	3	28		0.2	0.05		0.68	0.24	10.0	1.58
OLT-NearEast	sw	11/20/97 11:26	22.5	7.39	7.01	83.1	487	493		65	29	5	1.9	57		0.24	0.1		2.52	0.05	6.7	0.87
RC-DP	dp	11/20/97 13:46	24.4	7.27	4.99	54	519	465		87	9.4	3	4.3	16		0.2	0.09		38.9	0.05	-7.8	0.91
RC-nearE130	sw	11/20/97 13:27	22.6	7.37	5.75	74.7	353	360		63	9.2	3	3.1	15		0.2	0.05		3.68	0.05	7.7	0.82
RC-nearE130-TOP	sw	11/20/97 13:27	22.6	7.37	5.75	74.7	353															
TSB-UE	sw	11/20/97 15:27	24.5	7.63	7.86	72.6	513	503		72	25	6	6.4	42		3.7	0.05		0.87	0.12	1.4	0.16
TSB-UW	sw	11/20/97 15:35	24.9	7.66	7.84	72.5	491															

Blank cells indicate no sample, no measurement, no analysis or that the measurement was not applicable at that site.
Outlined 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 is calculated using milliequivalents as (cations-anions)/(cations+anions)*100.
Results below the minimum detection limit (M.D.L.) are listed as the M.D.L.

Table IV-2. Water Levels and Hydraulic Gradients: November 18, 1997 Page 1 of 2

Site ID	Site Type	Water Level Observation Date	Staff (feet)	Water Depth (feet)	Head Diff.* (cm)	Water Level Observation Date	Staff (feet)	Water Depth (feet)	Head Diff.* (cm)	Water Level Observation Date	Staff (feet)	Water Depth (feet)	Head Diff. (cm)	Avg. Hyd. Gradient (downward positive)
E121	sw	11/18/97 8:27	2.52	0.71										
E124	sw	11/18/97 19:57	0.83	0.6		11/19/97 8:03	0.81	0.58						
E124-T1EC-U1E	sw	11/18/97 16:03		0.7										
E125	sw	11/18/97 16:03	2.7	0.64		11/19/97 10:30	2.71	0.65						
E127	sw	11/18/97 8:37	2.38	0.93		11/19/97 10:40	2.37	0.92						
E127DP	dp	11/18/97 8:37			-0.9	11/19/97 16:13			0.5					-5.3E-03
E128	sw	11/18/97 8:49	2.32	1.43										
E128DP	dp	11/18/97 8:49			9.8									4.3E-02
E129	sw	11/18/97 9:13	2.28	1.29										
E129DP	dp	11/18/97 9:13			-1.1									-9.9E-03
E130	sw	11/18/97 14:55	2.1	0.8										
E130DP	dp	11/18/97 14:55			-1.2									-7.8E-03
E131	sw	11/18/97 9:22	2.22	2.3						11/20/97 9:00	2.2	1.83		
E131DP	dp									11/20/97 9:00			-0.6	-2.6E-03
E132	sw	11/18/97 15:24	2.13											
E133	sw					11/19/97 11:51	2	0.91						
E136	sw					11/19/97 14:25	1.94	1.23						
E137	sw	11/18/97 10:28	1.82	1										
E138	sw	11/18/97 10:32	1.62	1.07										
E138X	sw	11/18/97 10:33	1.55											
E141	sw	11/18/97 14:24	1.53	0.7		11/19/97 14:58	1.51	0.68						
E142	sw	11/18/97 10:37	1.48	0.93		11/19/97 14:34	1.48	0.93						
E143	sw									11/20/97 0:00	1.57	1.3		
E144DP	dp	11/18/97 0:00			0									0
E145	sw	11/18/97 12:16	1.43											
E146	sw	11/18/97 12:18	1.37	0.85						11/20/97 11:03	1.34	0.82		
E146DP	dp									11/20/97 11:03			0.2	-3.5E-03
E147	sw	11/18/97 10:44	1.37	1.11										
E148	sw	11/18/97 10:54	1.35	1.2										
E148DP	dp	11/18/97 10:44			-0.2					11/20/97 13:11			0	-4.4E-04
E149	sw	11/18/97 11:04	1.36	1.08										
E151(CP)	sw	11/18/97 11:09	1.42	1.02						11/20/97 12:21	1.4	1		
E151DP	dp									11/20/97 12:21			-0.4	-5.1E-03
E151DP	dp									11/20/97 13:00			-0.1	-1.3E-03
M-12-M6E	sw	11/18/97 15:24		0.9										

Head difference = tapedown water level inside piezometer/well - tapedown water level outside piezometer/well. Reference is top of piezometer/well casing. Correction for bias: 0.3 cm added to inside tapedown if drivepoint diameter < 1.25".

Shaded cells indicate water depths were calculated by applying an offset to staff data.

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

Table IV-2. Water Levels and Hydraulic Gradients: November 18, 1997 Page 2 of 2

Site ID	Site Type	Water Level Observation Date	Staff (feet)	Water Depth (feet)	Head Diff.* (cm)	Water Level Observation Date	Staff (feet)	Water Depth (feet)	Head Diff.* (cm)	Water Level Observation Date	Staff (feet)	Water Depth (feet)	Head Diff. (cm)	Avg. Hyd. Gradient (downward positive)
NP37	sw	11/18/97 14:34	1.51			11/19/97 15:25	1.51							
OLTC DP-U2	dp	11/18/97 10:56			-0.1					11/20/97 13:08			0.2	5.5E-04
OLT-NearEast	sw									11/20/97 10:36		0.7		
RC-DP	dp	11/18/97 10:07			-0.8					11/20/97 13:27			-1.8	-8.8E-03
TSB-S	sw									11/20/97 15:27	3.43			
TSB-UE	sw									11/20/97 15:27	3.42			

Head difference = tapedown water level inside piezometer/well - tapedown water level outside piezometer/well.
Reference is top of piezometer/well casing. Correction for bias: 0.3 cm added to inside tapedown if drivepoint diameter < 1.25"
Shaded cells indicate water depth was calculated by applying a correction factor to staff data.
Outlined cells indicate the result was flagged (e.g. value excessively low or high, not in keeping with history, etc.) and is suspect.

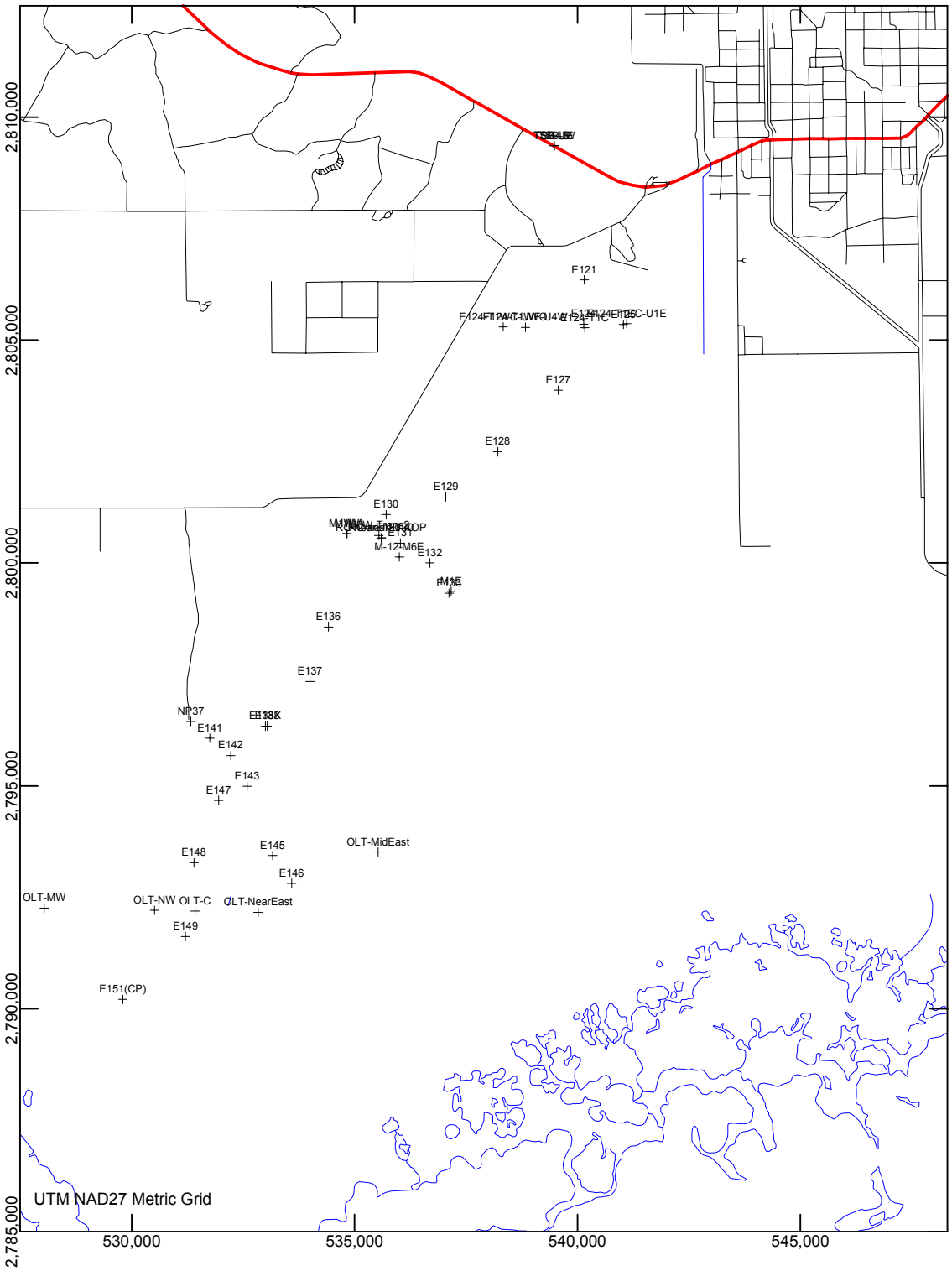

Figure IV-1. Surface-water monitoring sites: November 18-20, 1997.

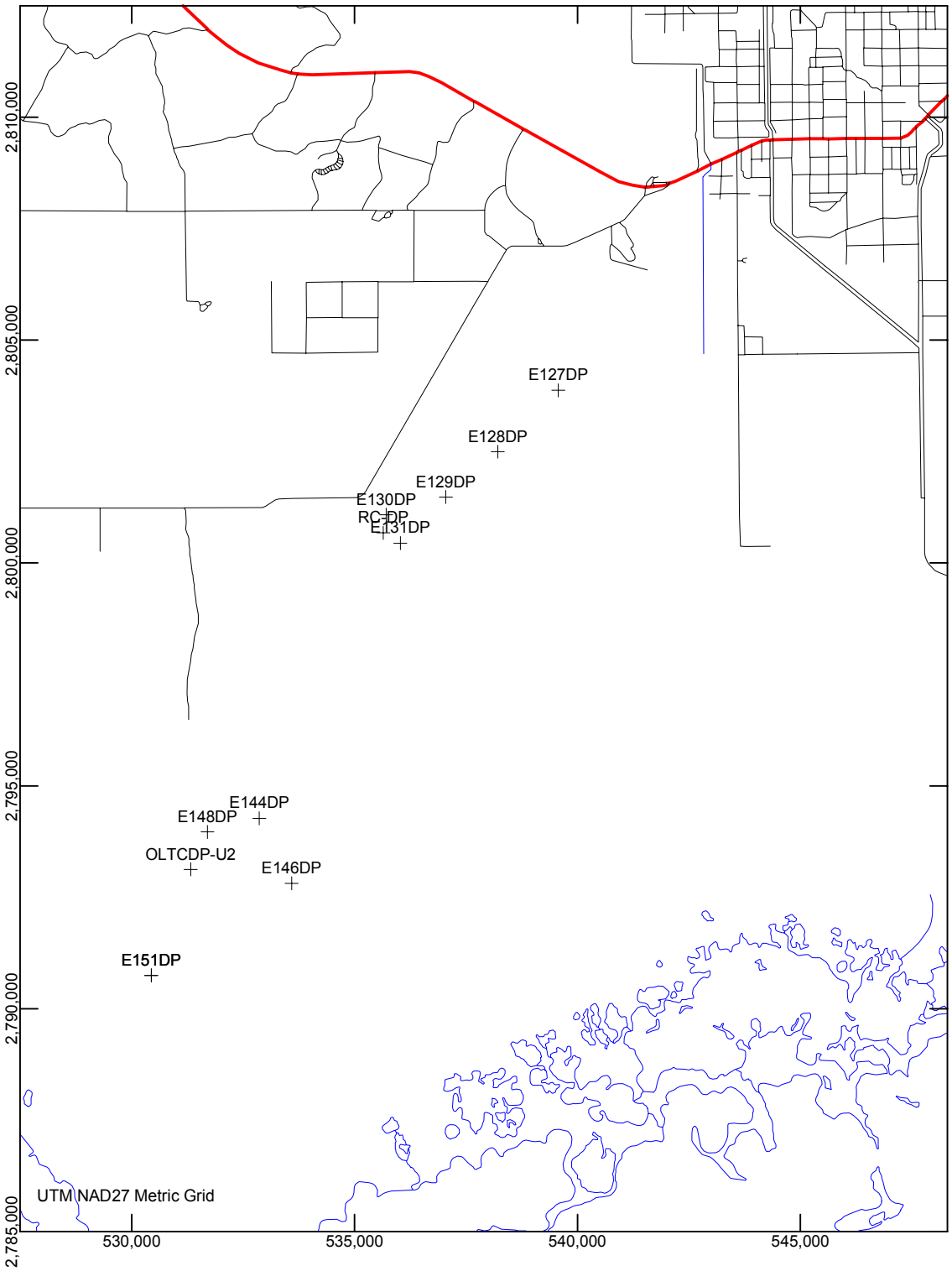

Figure IV-2. Ground-water monitoring sites: November 18-20, 1997.

APPENDIX V

Data Collected in Taylor Slough and Vicinity between

December 11 and 17, 1997

Table V-1. Chemical Analyses From Research Site Locations: December 11-17, 1997

Site ID	Site Type	Date	Field Parameters					Lab Spec. Cond. (µS)	Color (Pt/CO)	Ca (mg/L)	Na (mg/L)	Mg (mg/L)	SiO2 (mg/L)	Cl (mg/L)	Alk. as CaCO3 (mg/L)	SO4 (mg/L)	Br (mg/L)	Cation/ Anion Balance* (%)	Ammonium (µM)	Phosphate (µM)	δ^2H (‰)	$\delta^{18}O$ (‰)
			Temp. (°C)	pH	DO (mg/L)	ORP (mV)	Spec. Cond. (µS)															
								M.D.L		0.02	0.1	0.001	0.01	0.1	1	0.2	0.05		0.05	0.05		
CYP2(100')	gw	12/16/97 0:00	19.3	7.95	11		454															
E130	sw	12/16/97 10:20	20.9	7.85	11.09	14.3	362	374		66	7.3	3	3	12		0.2	0.05		1.24	0.05	-5.5	-1.60
E130	sw	12/11/97 0:00	21.1	7.83			320	394		71	7.1	4	3	13		0.2	0.05		1.36	0.05		
E130(10')	gw	12/11/97 0:00	26.0	7.8			439	491		87	8.1	4	3.9	16		0.2	0.09		18.4	0.123		
E130(52')	gw	12/16/97 12:00						481		83	9.2	4	4.1	17		0.34	0.09		15.8	0.123		
E141	sw	12/16/97 14:18	21.2	7.9	10.45	11.9	319	329		53	9.5	3	2.2	18		0.2	0.05		1.8	0.05	-3.0	-1.05
E146	sw	12/16/97 0:00	18.0	7.7			280	318		53	11	3	1.3	17		0.2	0.05		1.94	0.123		
E146	sw	12/16/97 12:00																	2.42	0.05		
E146(15')	gw	12/16/97 0:00	26.1	6.68			13580	15200		480	2500	260	8.4	4900		560	11		74.3	0.11		
E146(25')	gw	12/16/97 0:00	25.5	6.61			18500	20300		540	3500	370	8.3	6700		810	16		73.3	0.241		
E146(27.5')	gw	12/16/97 12:00	25.1	6.7				26400		550	4700	540	8.3	9200		1200	20		74	0.503		
G3337(100'-85')	gw	12/16/97 0:00	19.5	7.93	10.28		430															
L31W-G3319(141')	gw	12/17/97 12:00						471		71	19	5	5.9	30		3.1	0.09		4.97	0.123		
L31W-G3319B(40')	gw	12/17/97 12:00						532		79	23	5	5.4	37		4.7	0.09		7.9	0.11		
L31W-S332TW	sw	12/17/97 12:00						495		73	19	5	4.9	32		4.7	0.08		7.85	0.241		
OLT-C	sw	12/16/97 13:30	18.4	7.78	9.48	-4.5	307	308		48	10	3	1.9	19		0.2	0.05		3.22	0.123	2.8	-0.17
RC-nearE130-TOP	sw	12/16/97 12:24	17.5	7.39	8.63	11.7	367															
S-175	sw	12/17/97 12:00						248		35	21	2	7.1	32		12	0.09		3.82	0.05		
TSB(15')	gw	12/11/97 0:00	27.0	7.07			460	519		83	18	5	4.7	30		0.57	0.09					
TSB(34')	gw	12/11/97 0:00	25.9	7.5			440	486		74	21	5	4.9	32		0.2	0.09					
TSB(57')	gw	12/11/97 0:00	24.1	7.09			430	480		71	22	5	5.2	32		0.26	0.09					
TSB-UE	sw	12/11/97 0:00	27.8	7.59			430	480		70	22	5	5.4	36		4.1	0.05					
TSB-UE	sw	12/16/97 0:00	19.3	7.95	11		454	465		72	20	5	5.5	34		2.3	0.05		1.34	0.05	0.9	-0.22
TSB-UW	sw	12/16/97 0:00	19.5	7.93	10.28	16.8	430															

Blank cells indicate no sample, no measurement, no analysis or that the measurement was not applicable at that site.
Outlined 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 is calculated using milliequivalents as (cations-anions)/(cations+anions)*100.
Results below the minimum detection limit (M.D.L.) are listed as the M.D.L.

Table V-2. Water Levels and Hydraulic Gradients: December 16, 1997.

Site ID	Site Type	Water Level Observation Date	Staff (feet)	Water Depth (feet)	Head Diff. (cm)	Avg. Hyd. Gradient (downward positive)
E121	sw	12/16/97 16:01	3.42	1.61		
E124	sw	12/16/97 15:45	1.58	1.35		
E125	sw	12/16/97 16:01	3.42	1.36		
E127	sw	12/16/97 10:20	3.02	1.57		
E127DP	dp	12/16/97 10:20			-0.6	-6.9E-03
E128	sw	12/16/97 10:56	2.88	1.99		
E129	sw	12/16/97 11:15	2.8	1.81		
E129DP	dp	12/16/97 11:15			-0.5	-4.5E-03
E130	sw	12/16/97 15:30	2.62	1.32		
E130DP	dp	12/16/97 15:30			-0.9	-5.8E-03
E141	sw	12/16/97 14:18	1.9	1.07		
E142	sw	12/16/97 14:10	1.9	1.35		
E144	sw	12/16/97 12:38	1.84	1.3		
E145	sw	12/16/97 12:32	1.75			
E146	sw	12/16/97 12:26	1.67	1.15		
E147	sw	12/16/97 12:44	1.72	1.46		
RC-DP	dp	12/16/97 12:24			-0.9	-6.1E-03
TSB-S	sw	12/16/97 16:44	4.55			
TSB-UE	sw	12/16/97 16:44	4.68			

Head difference = tapedown water level inside piezometer/well - tapedown water level outside piezometer/well. Reference is top of piezometer/well casing. Correction for bias: 0.3 cm added to inside tapedown if drivepoint diameter < 1.25".

Shaded cells indicate water depths were calculated by applying an offset to staff data.

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

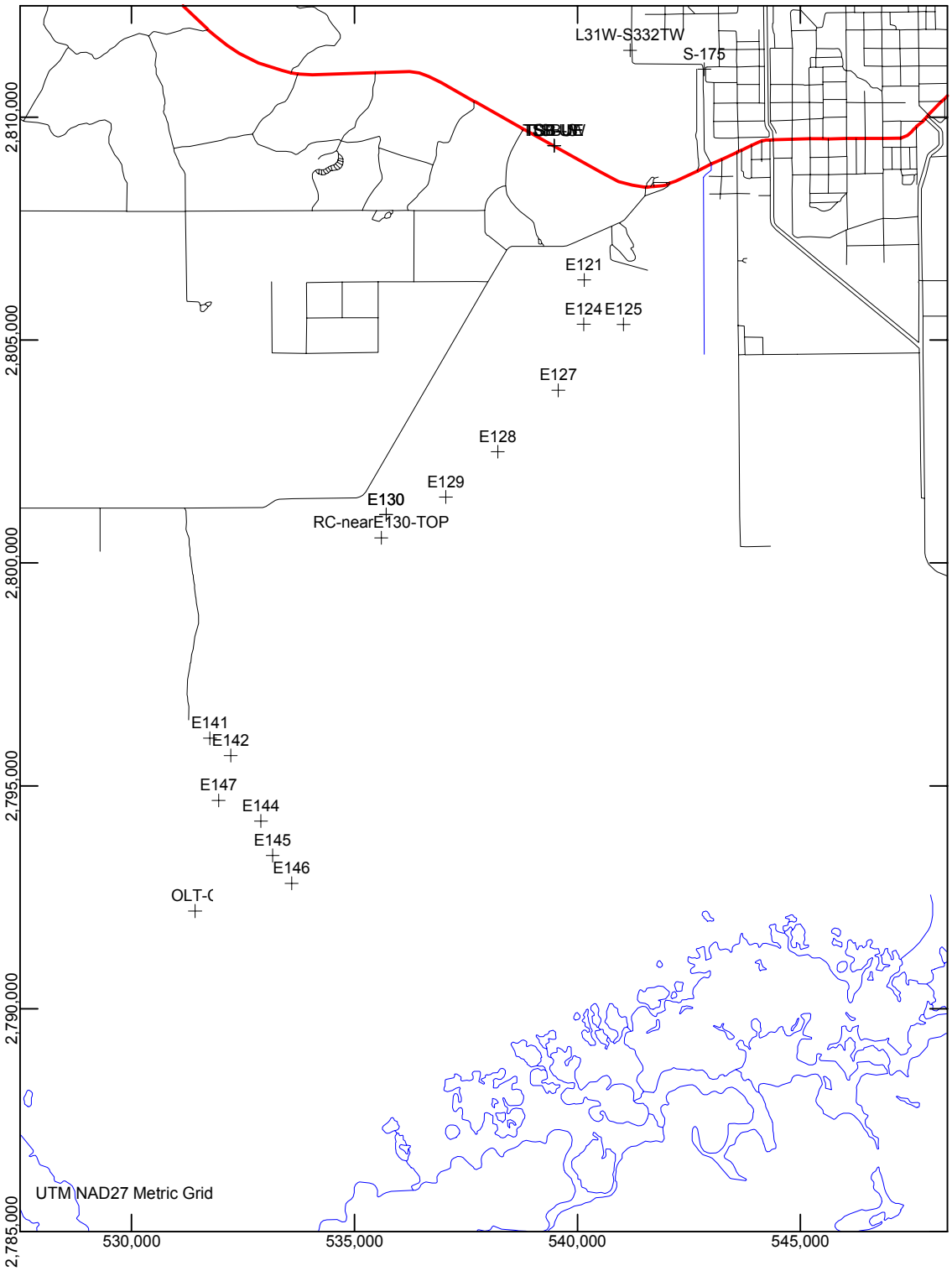

Figure V-1. Surface-water monitoring sites: December 11-17, 1997.

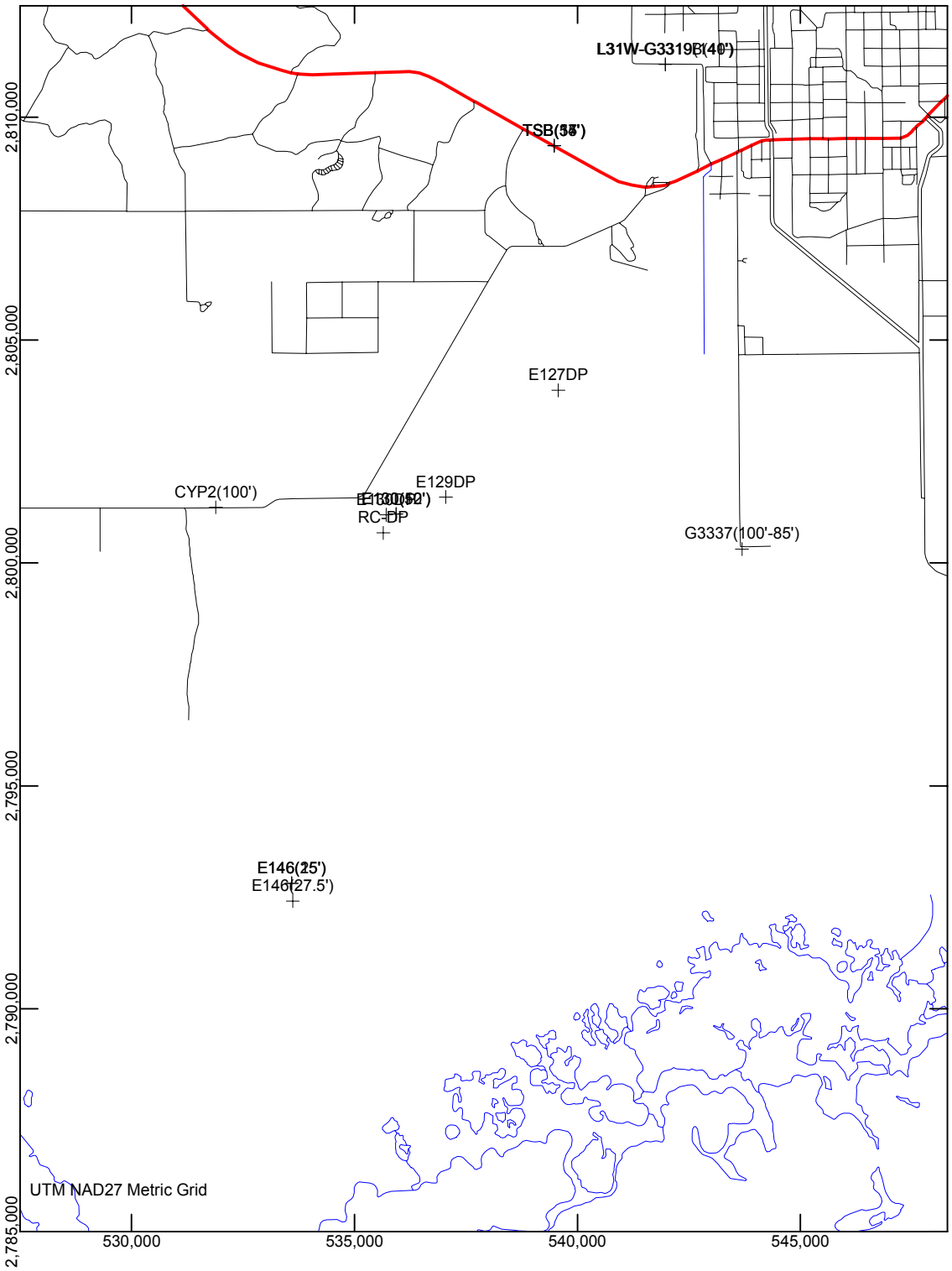

Figure V-2. Ground-water monitoring sites: December 11-17, 1997.

APPENDIX VI

Data Collected in Taylor Slough and Vicinity between

June 3 and 6, 1998

Table V1-1. Chemical Analyses From Research Site Locations: June 3-6, 1998 Page 1 of 2

Site ID	Site Type	Date	Field Parameters					Lab Spec. Cond. (µS)	Color (Pt/CO)	Ca (mg/L)	Na (mg/L)	Mg (mg/L)	SiO2 (mg/L)	Cl (mg/L)	Alk. as CaCO3 (mg/L)	SO4 (mg/L)	Br (mg/L)	Cation/ Anion Balance* (%)	Ammonium (µM)	Phosphate (µM)	δ^2H (‰)	$\delta^{18}O$ (‰)
			Temp. (°C)	pH	DO (mg/L)	ORP (mV)	Spec. Cond. (µS)															
								M.D.L.		0.02	0.1	0.001	0.01	0.1	1	0.2	0.05		0.05	0.05		
CYP2(10')	gw	6/3/98 0:00	26.6	6.98			419	386		74	8.5	2.5	2.9	16		0.9	0.05					
CYP2-SW-S	sw	6/3/98 0:00	34.4	7.21			402	340		58	7.7	2.2	4.8	17		11	0.05					
E124-D2	sw	6/6/98 18:00		5.4	0.51	-32.9	754															
E124-T1C	sw	6/6/98 12:00						470		70	22	5.4	11	3.6		2.5	0.09					
E127	sw	6/6/98 17:43	40.0	7.99	10.05	56.2	606															
E128	sw	6/6/98 17:32	38.8	7.92	10.12	66.9	641															
E129	sw	6/6/98 17:20	37.1	7.68	7.84	66.3	602															
E130	sw	6/4/98 0:00	38.6	7.41			402	323		54	11	2.9	3	17		3.6	0.05					
E130	sw	6/6/98 15:54		7.94	10.13	71.9	505															
E130(10')	gw	6/4/98 0:00	27.4	6.75			526	480		89	8.8	3.9	3.9	17		0.2	0.1					
E130(52')	gw	6/4/98 0:00	25.8	6.81			506	472		86	9.1	3.7	4	17		0.2	0.1					
E131	sw	6/6/98 17:15	37.4	8.18	11.1	57.3	621															
E137	sw	6/6/98 15:18	39.8	7.96	9.32	64	504															
E144	sw	6/6/98 14:55	38.4	8.32	12.33	62.8	469															
E146	sw	6/4/98 12:00	31.0	7.01			663	549		73	34	5.4	4.8	67		0.2	0.2					
E146(15')	gw	6/4/98 0:00	27.2	6.57			17980	16050		500	2800	270	7.7	5400		650	17					
E146(25')	gw	6/4/98 0:00	26.5	6.46			22000	20160		550	3600	380	7.7	7000		890	23					
E146(27.5')	gw	6/4/98 0:00	26.3	6.53			28400	26230		560	5000	550	7.2	9400		1200	30					
E147	sw	6/6/98 14:50	38.7	8.08	11.25	71.7	489															
E151(CP)	sw	6/6/98 12:15	34.6	7.38	6.91	87.9	1489	930		61	100	12	11	210		0.2	0.3					
G3318(??m)	gw	6/3/98 0:00	25.3	7.41			2820	2680		120	350	45	16	770		73	2.5					
G3318(23m)	gw	6/3/98 0:00	24.9	7.32			2310	2200		140	260	27	14	620		33	2					
G3318(41m)	gw	6/3/98 0:00	25.1	7.38			3080	2960		150	400	33	18	840		79	2.6					
G3318(9m)	gw	6/3/98 0:00	25.3	7.04			427	403		77	8.3	2.1	3.4	15		0.2	0.07					
L31W-G3319(141')	gw	6/3/98 12:00	26.9	7.04			580	534		71	32	7.3	6.4	52		2.5	0.1					
L31W-G3319B(40')	gw	6/3/98 12:00	25.6	7.29			465	434		61	21	5	9.5	38		3.1	0.09					
L31W-G3319TW	gw	6/3/98 0:00	25.3	8.69			357															
L31W-S332TW	sw	6/3/98 12:00	29.0	7.13			634															
M1W	sw	6/6/98 15:38	39.8	7.96	10.09	63.5	453															
NP67(20')	gw	6/3/98 0:00	26.6				490	453		85	8.6	3.2	3.4	16		0.2	0.09					
NP67-S	sw	6/3/98 0:00	28.7	6.84			594	479		93	8.9	3.2	3.8	17		0.6	0.06					
OLT-C	sw	6/6/98 12:45	34.3	7.57	6.6	72.1	935	572		62	44	6.9	10	86		0.2	0.2					
OLTC-U2	sw	6/6/98 14:20	35.6	7.41	7.12	75.2	600															
RC-nearE130-TOP	sw	6/6/98 15:47	36.2	7.67	7.13	72.2	539															
S-175	sw	6/3/98 12:00	30.5	7.14			634	562		69	33	9.8	7	58		6.5	0.1					
TSB(15')	gw	6/3/98 0:00	26.3	6.57			611	560		89	24	5.1	4.6	41		0.2	0.1					

Blank cells indicate no sample, no measurement, no analysis or that the measurement was not applicable at that site.
Outlined 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 is calculated using milliequivalents as (cations-anions)/(cations+anions)*100.
Results below the minimum detection limit (M.D.L.) are listed as the M.D.L.

Table V1-1. Chemical Analyses From Research Site Locations: June 3-6, 1998 Page 2 of 2

Site ID	Site Type	Date	Field Parameters					Lab Spec. Cond. (µS)	Color (Pt/CO)	Ca (mg/L)	Na (mg/L)	Mg (mg/L)	SiO2 (mg/L)	Cl (mg/L)	Alk. as CaCO3 (mg/L)	SO4 (mg/L)	Br (mg/L)	Cation/ Anion Balance* (%)	Ammonium (µM)	Phosphate (µM)	δ^2H (‰)	$\delta^{18}O$ (‰)
			Temp. (°C)	pH	DO (mg/L)	ORP (mV)	Spec. Cond. (µS)															
								M.D.L.		0.02	0.1	0.001	0.01	0.1	1	0.2	0.05		0.05	0.05		
TSB(34')	gw	6/3/98 0:00	24.9	6.75			521	495		76	22	5.1	4.9	36		0.2	0.1					
TSB(57')	gw	6/3/98 0:00	24.6	6.75			486	458		72	20	5	6.8	31		0.3	0.09					
TSB-EBC(BoxCulvert)	sw	6/6/98 20:05	31.6	7.78	5.88	57.5	770															
TSB-UE	sw	6/3/98 0:00	31.2	7.14			602	552		67	36	10	8.4	59		4.4	0.09					
TSB-UE	sw	6/6/98 19:49	32.8	7.36	2.65	53.9	905															
TSB-UW	sw	6/6/98 19:55	32.1	7.3	2.06	55.7	843															
TSB-WBC(BoxCulvert)	sw	6/6/98 20:00	33.1	7.79	6.41	52.7	636															

Blank cells indicate no sample, no measurement, no analysis or that the measurement was not applicable at that site.
Outlined 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 is calculated using milliequivalents as (cations-anions)/(cations+anions)*100.
Results below the minimum detection limit (M.D.L.) are listed as the M.D.L.

Table V1-2. Water Levels and Hydraulic Gradients: June 3-4, 1998

Site ID	Site Type	Water Level Observation Date	Staff (feet)	Water Depth (feet)	Head Diff.* (cm)	Water Level Observation Date	Staff (feet)	Water Depth (feet)	Head Diff. (cm)	Avg. Hyd. Gradient (downward positive)
E121	sw					6/6/98 8:51	2.61	0.8		
E124	sw					6/6/98 8:46	0.89	0.66		
E127	sw	6/4/98 12:00	2.5	1.05		6/6/98 17:43	2.42	0.97		
E127DP	dp	6/4/98 12:00			-1.5	6/6/98 17:43			-1	-1.4E-02
E128	sw					6/6/98 17:32	2.36	1.47		
E128DP	dp					6/6/98 17:32			-1	-4.4E-03
E129DP	dp					6/6/98 17:20			-0.8	-7.2E-03
E130	sw	6/4/98 12:00	2.2	0.9		6/6/98 15:54	2.16	0.86		
E130(10')	gw	6/4/98 0:00			-2.0					-6.6E-03
E130DP	dp	6/4/98 12:00			-0.5	6/6/98 15:54			-1.1	-5.2E-03
E131	sw					6/6/98 17:15	2.26	1.89		
E131DP	dp					6/6/98 17:15			-0.4	-1.7E-03
E137	sw					6/6/98 15:18	1.76	0.94		
E138	sw					6/6/98 10:12	1.48	0.8		
E141	sw					6/6/98 10:24	1.36	0.53		
E142	sw					6/6/98 10:30	1.32	0.77		
E144	sw					6/6/98 14:54	1.2	0.66		
E144DP	dp					6/6/98 14:55			-0.5	-1.4E-02
E146	sw	6/4/98 12:00	1	0.48						
E146(15')	gw	6/4/98 0:00								
E146(25')	gw	6/4/98 0:00								
E146(27.5')	gw	6/4/98 0:00								
E146DP	dp	6/4/98 12:00			-0.5					-8.8E-03
E147	sw					6/6/98 14:44	1.10	0.84		
E148DP	dp					6/6/98 14:40			-0.4	-1.8E-03
E149	sw					6/6/98 10:39	0.76	0.48		
E151(CP)	sw	6/4/98 12:00	0.6	0.2		6/6/98 11:12	0.58	0.18		
E151DP	dp					6/6/98 11:18			0	0
E151DP	dp					6/8/98 12:00			0	0
OLTCDP-U2	dp					6/6/98 14:15			-0.1	-1.1E-03
RC-DP	dp					6/6/98 15:47			-0.8	-5.4E-03
TSB-S	sw	6/3/98 8:40	3.6			6/6/98 19:40	3.3			
TSB-UE	sw	6/3/98 8:40	3.6			6/6/98 19:40	3.3			

Head difference = tapedown water level inside piezometer/well - tapedown water level outside piezometer/well. Reference is top of piezometer/well casing. Correction for bias: 0.3 cm added to inside tapedown if drivepoint diameter < 1.25".

Shaded cells indicate water depths were calculated by applying an offset to staff data.

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

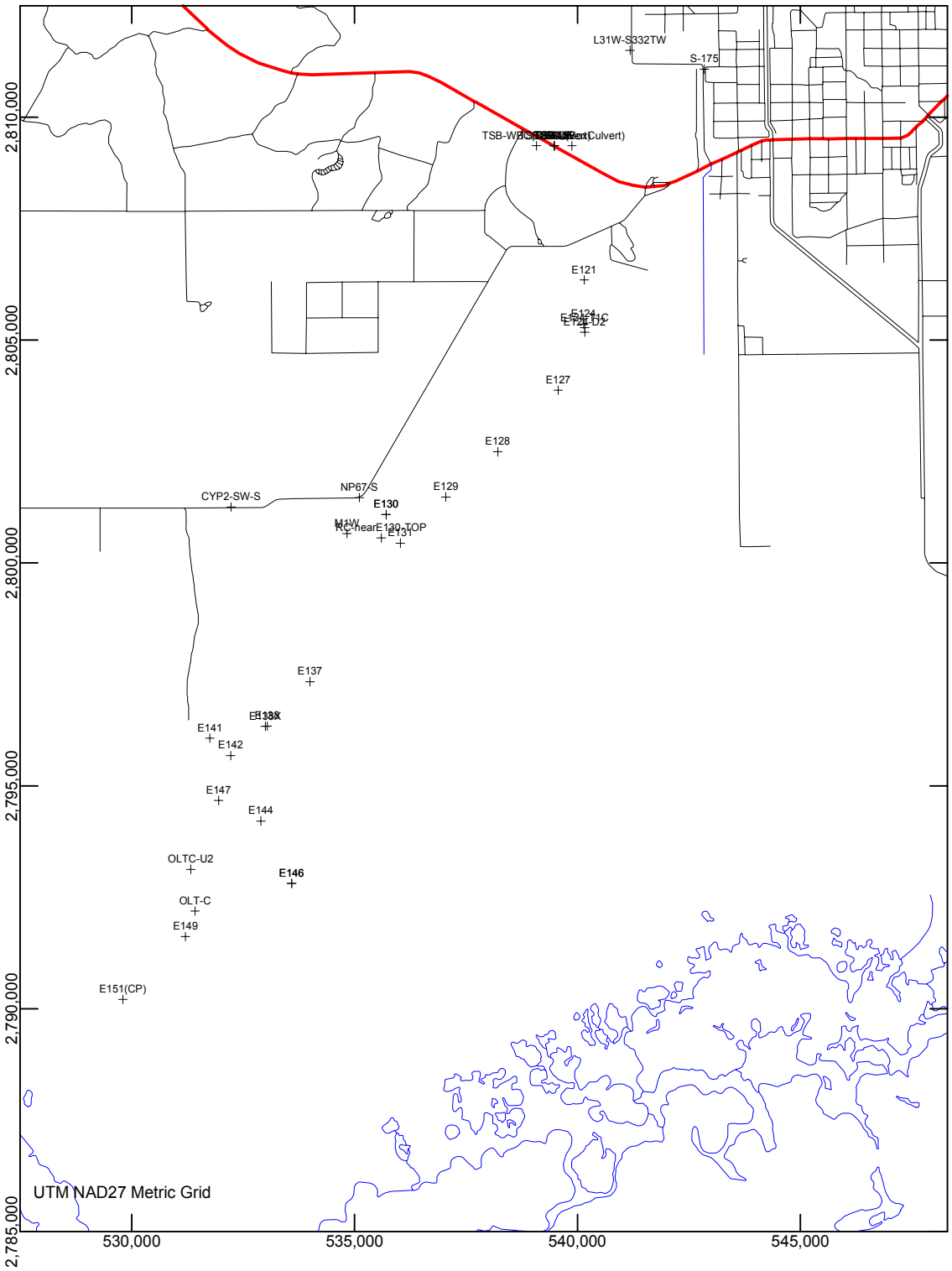

Figure VI-1. Surface-water monitoring sites: June3-6, 1998.

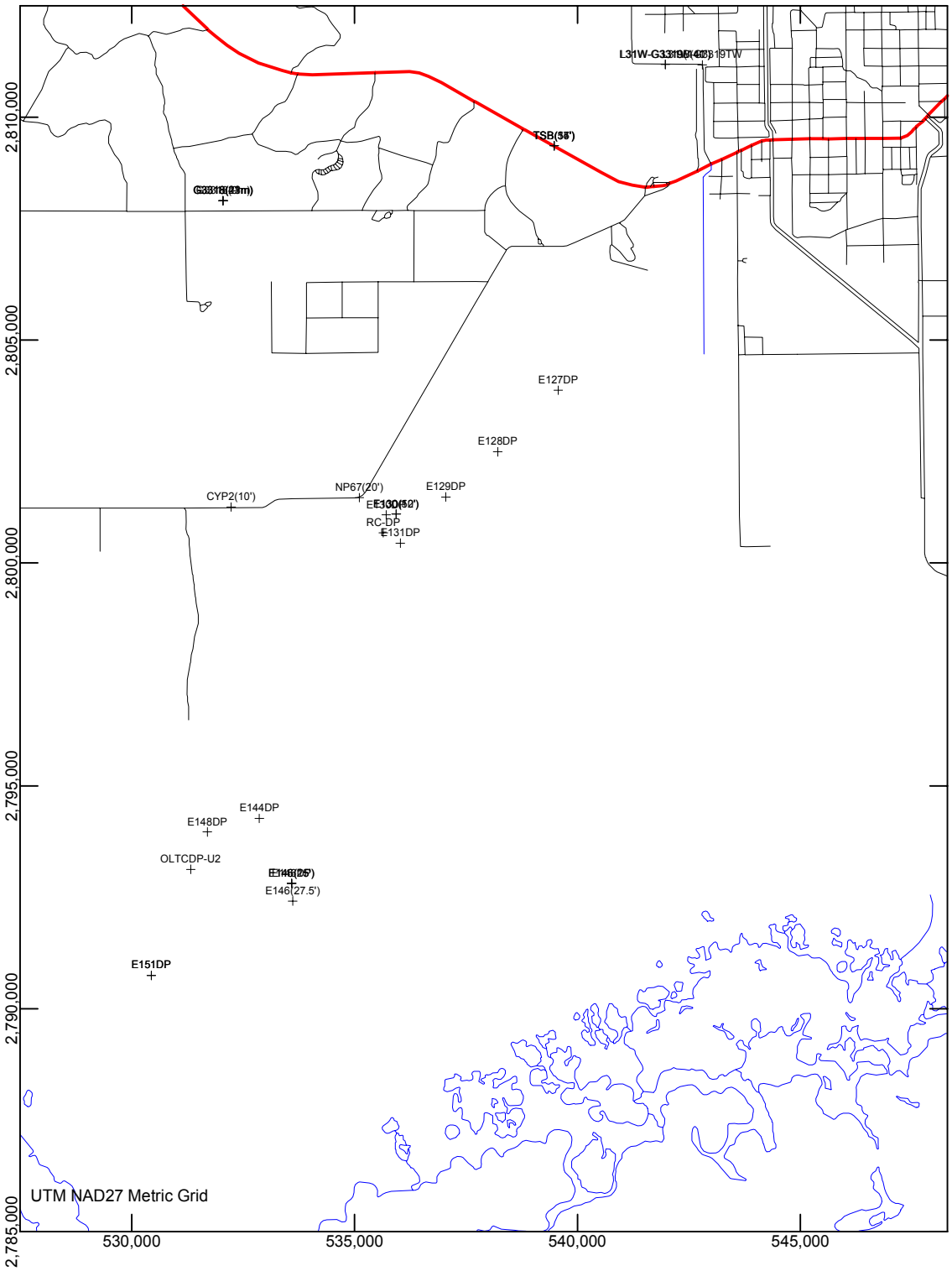

Figure VI-2. Ground-water monitoring sites: June 3-6, 1998.

APPENDIX VII

Data Collected in Taylor Slough and Vicinity between

July 20 and 23, 1998

Table VII-1. Chemical Analyses From Research Site Locations: July 20-23, 1998 Page 1 of 2

Site ID	Site Type	Date	Field Parameters					Lab Spec. Cond. (µS)	Color (Pt/CO)	Ca (mg/L)	Na (mg/L)	Mg (mg/L)	SiO2 (mg/L)	Cl (mg/L)	Alk. as CaCO3 (mg/L)	SO4 (mg/L)	Br (mg/L)	Cation/ Anion Balance* (%)	Ammonium (µM)	Phosphate (µM)	δ^2H (‰)	$\delta^{18}O$ (‰)
			Temp. (°C)	pH	DO (mg/L)	ORP (mV)	Spec. Cond. (µS)															
								M.D.L.		0.02	0.1	0.001	0.01	0.1	1	0.2	0.05		0.05	0.05		
CYP2-SW-N	sw	7/23/98 12:20	30.4	7.4	5.39	226.4	381															
CYP2-SW-S	sw	7/23/98 12:20	29.2	6.93	1.73	91.6	584															
CYP2-W1-N	sw	7/23/98 13:10	30.0	7.34	4.69	276.8	376															
CYP2-W1-S	sw	7/23/98 13:10	26.3	6.87	1.65	130.6	671															
CYP2-W2-N	sw	7/23/98 13:22	29.7	7.32	4.59	338.9	367															
CYP2-W2-S	sw	7/23/98 13:22	29.2	7.17	4.36	382.6	374															
E121	sw	7/22/98 13:01	29.2	7.52	8.29	398.5	389	364		47	22	5.6	6.3	34		1.3	0.05				9.5	0.98
E123	sw	7/22/98 12:30						302		53	7.7	2.2	4.4	14		0.2	0.05				1.4	-0.64
E123-FW	sw	7/22/98 12:17	28.9	7.61	9.71	409.6	322															
E123-NN	sw	7/21/98 15:39	33.7	8.25	11.42	389	354															
E123-NW	sw	7/21/98 15:39	30.4	7.28	7.23	400	331															
E124-D2	sw	7/21/98 15:18	31.7	7.25	4.11	392	398															
E124-T1C	sw	7/22/98 11:11	27.8	7.16	7.29	408	423	403		53	24	5.7	6.9	39		1.5	0.05				6.7	0.79
E125	sw	7/21/98 15:39	33.6	8.16	8.23	387.6	340															
E127	sw	7/21/98 15:18	33.8	8.08	9.42	390	298	348		44	22	4.7	7.3	36		1.3	0.05				12.0	1.33
E127	sw	7/22/98 12:44	21.3	6.92	5.33	103.5	385															
E128	sw	7/21/98 15:18	31.5	7.56	6.49	381.9	344															
E129	sw	7/21/98 15:09	30.8	7.24	10	377.5	363															
E130	sw	7/21/98 10:40	30.2	7.65	7.63	415	296	328		58	7.7	3.2	2.6	14		0.2	0.05				4.1	0.02
E130(52')	gw	7/21/98 10:13	25.6	6.65	0.81	-22.3	428	475		89	7.9	3.8	3.8	16		0.2	0.1					
E131	sw	7/21/98 14:14	30.0	7.33	4.33	298	326	380		56	20	4.2	11	33		0.3	0.05				11.0	1.99
E131-S	sw	7/21/98 12:50	31.2	6.64	3.21	24.5	390															
E131-SP	sw	7/21/98 12:50	28.4	6.6	0.69	-24.9	412															
E132	sw	7/21/98 11:32	29.3	7.66	6	359.8	398	442		67	21	5.3	10	36		0.4	0.05				10.5	1.71
E133	sw	7/21/98 12:09	29.1	7.47	6.63	388.3	360	391		55	22	3.9	9.5	39		0.2	0.05				11.5	1.78
E133(RC-FE)	sw	7/21/98 11:55						422		62	21	5.2	9.7	37		0.3	0.05				12.1	1.89
E136	sw	7/21/98 14:35	29.8	6.85	1.21	-0.6	325															
E137	sw	7/21/98 14:35	31.3	7.57	6.44	275	277															
E138	sw	7/21/98 14:48	35.4	7.98	10.58	366.9	273															
E142	sw	7/20/98 16:27	37.7	8.44	9.81	401	288	279		46	9.7	2.5	2	18		0.2	0.05				8.3	1.11
E144	sw	7/20/98 15:22	34.6	7.88	8.94	318	307	270		48	9.4	2.8	7.6	17		0.2	0.05				7.6	1.41
E145	sw	7/20/98 15:22	36.7	7.76	6.24	44	337															
E146	sw	7/20/98 14:33	34.8	7.39	1.4	-110	463	377		51	23	3.9	8	43		0.2	0.08				15.5	3.07
E151(CP)	sw	7/20/98 13:58	34.5	8.2	7.54	409.6	542	540		45	50	7.4	6.4	98		0.2	0.2				15.1	3.10
G3318(??m)	gw	7/23/98 10:15					743	406		79	7.9	2.1	3.4	15		0.2	0.08				-8.7	-1.93
G3318(9m)	gw	7/23/98 9:35					4800	2.6		120	370	43	16	730		70	2.4				-11.8	-2.47

Blank cells indicate no sample, no measurement, no analysis or that the measurement was not applicable at that site.
Outlined 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 is calculated using milliequivalents as (cations-anions)/(cations+anions)*100.
Results below the minimum detection limit (M.D.L.) are listed as the M.D.L.

Table VII-1. Chemical Analyses From Research Site Locations: July 20-23, 1998 Page 2 of 2

Site ID	Site Type	Date	Field Parameters					Lab Spec. Cond. (µS)	Color (Pt/CO)	Ca (mg/L)	Na (mg/L)	Mg (mg/L)	SiO2 (mg/L)	Cl (mg/L)	Alk. as CaCO3 (mg/L)	SO4 (mg/L)	Br (mg/L)	Cation/ Anion Balance* (%)	Ammonium (µM)	Phosphate (µM)	δ^2H (‰)	$\delta^{18}O$ (‰)
			Temp. (°C)	pH	DO (mg/L)	ORP (mV)	Spec. Cond. (µS)															
								M.D.L		0.02	0.1	0.001	0.01	0.1	1	0.2	0.05		0.05	0.05		
G3318-ROAD-NSIDE	sw	7/23/98 10:58					415															
G3318-ROAD-SSIDE	sw	7/23/98 10:58					713															
G3337SW	sw	7/22/98 17:53	30.25	6.99	6.8	482.1	456	425		65	19	4.9	3.7	32		1.2	0.06				3.6	0.14
IH-E	sw	7/23/98 11:16	27.44	3.73		348.7	791															
IH-W-Ditch	sw	7/23/98 11:16	26.46	6.74	2.32	357.6	622															
L31W-G3319B(40')	gw	7/22/98 16:26	28.9	6.8	0.52	-23.7	554	517		70	29	7.6	6.5	47		2.2	0.1				8.2	1.03
L31W-G3319TW	gw	7/22/98 15:59	28.6	6.93	5.88	307.4	537	501		70	27	6.6	6.2	44		2.5	0.1				6.4	0.79
L31W-S332TW	sw	7/22/98 16:26	28.1	6.95	6.36	410	519															
L31WSOUTHEND	sw	7/23/98 16:53	30.1	6.87	9.22	422.5	907	486		74	24	6	5	39		9.9	0.1				1.6	-0.08
NP37	sw	7/20/98 16:13	36.9	7.16	0.59	-50.3	316	278		36	16	3.3	2.8	31		0.2	0.07				11.3	1.89
NP67-200mNorth	sw	7/23/98 14:00	36.4	7.75	8.86	333.7	787	424		81	9.5	3.2	4.4	19		0.4	0.05				2.0	-0.29
NP67-CUL	sw	7/23/98 12:15	29.76	7.19	3.98	398.1	389	210		36	5.9	1.6	2.7	11		0.7	0.05				0.2	-0.47
NP67-N	sw	7/23/98 14:00	28.6	6.77	2.9	210.3	862															
NP67-S	sw	7/23/98 14:00	29.6	7.29	5	286.7	416															
OLT-C	sw	7/20/98 13:21	33.8	8.07	4.52	397.6	347	315		42	16	3.9	6.4	31		0.2	0.05				14.2	2.77
OLT-E	sw	7/20/98 13:41	36.2	8.53	6.91	340	387															
OLT-FE	sw	7/20/98 15:22	36.6	7.2	2.2	-58	534															
OLT-MW2	sw	7/20/98 13:41	36.2	8.54	12.33	393	355															
PineRMP	sw	7/22/98 13:17	27.8	7.28	6.3	373	360															
RC-EastEnd	sw	7/21/98 12:02	28.7	7.47	3.31	263	380															
RC-nearE130-BOT	sw	7/21/98 14:14	30.4	6.67	0.85	44.6	433	259		42	8.1	2.5	2.4	14		0.2	0.05				8.0	0.68
RC-nearE130-BOT	sw	7/22/98 9:20	29.2	6.49	0.27	-40.9	491															
RC-nearE130-BOT	sw	7/22/98 10:33	27.5	7.2	0.39	301	295															
RC-nearE130-TOP	sw	7/21/98 14:14	31.3	7.77	7.65	318	251	260		44	7.8	2.6	2.4	14		0.2	0.05				8.9	0.62
RC-nearE130-TOP	sw	7/22/98 9:52	27.4	7.15	2.24	134.1	276															
TSB(34')	gw	7/20/98 19:08	24.3	7.69	0.71	-30.4	488	494		78	22	5.3	5	36		0.2	0.08					
TSB-2ndPipeCulE	sw	7/20/98 19:26	33.6	8.92	9.65	252	354															
TSB-3rdPipeCulE	sw	7/20/98 19:30	33.8	8.95	10.08	329.2	320															
TSB-UE	sw	7/20/98 18:29	35.4	8.59	11.31	417	433	431		57	26	6.3	6.8	41		1.7	0.06					
TSB-UM	sw	7/20/98 18:29	33.6	8.26	8.34	437.2	424															
TSB-UW	sw	7/20/98 18:29	34.6	8.61	9.79	430.4	359															
TSB-WBC(BoxCulvert)	sw	7/20/98 19:30	34.3	8.83	10.25	342	357															

Blank cells indicate no sample, no measurement, no analysis or that the measurement was not applicable at that site.
Outlined 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 is calculated using milliequivalents as (cations-anions)/(cations+anions)*100.
Results below the minimum detection limit (M.D.L.) are listed as the M.D.L.

Table VII-2. Water Levels and Hydraulic Gradients: July 20, 1998 Page 1 of 2

Site ID	Water Level Observation Date	Staff (feet)	Water Depth (feet)	Head Diff.* (cm)	Water Level Observation Date	Staff (feet)	Water Depth (feet)	Head Diff.* (cm)	Water Level Observation Date	Staff (feet)	Water Depth (feet)	Head Diff. (cm)	Avg. Hyd. Gradient (downward positive)
E121	7/20/98 9:50	2.88	1.07						7/22/98 13:01		1.42		
E123-FW									7/22/98 12:17		1		
E123-NN					7/21/98 15:39		0.88						
E123-NW					7/21/98 15:39		0.83						
E124	7/20/98 9:55	1.09	0.86						7/22/98 12:07	1.16	1		
E124-D2					7/21/98 15:18		1.13						
E125					7/21/98 15:39	2.98	0.92						
E127	7/20/98 10:00	2.58	1.13		7/21/98 15:18	2.61	1.17		7/22/98 11:04	2.64	1.19		
E127DP	7/20/98 10:00			-0.6	7/21/98 15:18			-0.9	7/22/98 11:04			-0.5	-7.6E-03
E128	7/20/98 10:07	2.48	1.59		7/21/98 15:18	2.47	1.73		7/22/98 10:59	2.54	1.65		
E128DP	7/20/98 10:07			-0.4	7/21/98 15:18			-0.6	7/22/98 10:59			-0.3	-1.9E-03
E129	7/20/98 10:13	2.4	1.41		7/21/98 15:09	2.42	1.52		7/22/98 10:51	2.48	1.49		
E129DP	7/20/98 10:13			-0.7	7/21/98 15:09			-0.5	7/22/98 10:51			-0.7	-5.7E-03
E130	7/20/98 10:18	2.25	0.95										
E130(10')					7/21/98 9:43			-2.4					-7.9E-03
E130(52')					7/21/98 9:43			-3					-1.9E-03
E130DP	7/20/98 10:18			-0.8									-5.2E-03
E131	7/20/98 10:18	2.34	1.97		7/21/98 14:14	2.38	2.01		7/22/98 10:45	2.47	2.1		
E131DP	7/20/98 10:18			-0.7	7/21/98 14:14			0	7/22/98 10:45			0.3	-5.8E-04
E132					7/21/98 11:32	2.26							
E133					7/21/98 12:09	2.09	1						
E136					7/21/98 14:35	2	1.42						
E137	7/20/98 10:18	2.8	1.98		7/21/98 14:35	1.84	1.17						
E138	7/20/98 10:42	1.51	0.83		7/21/98 14:48	1.53	1.17						
E141	7/20/98 10:42	1.42	0.59										
E142	7/20/98 10:42	1.4	0.85										
E144	7/20/98 15:22	1.27	0.73										
E144DP	7/20/98 15:22			0									0
E145	7/20/98 15:22	1.22											
E146	7/20/98 14:33	1.1	0.58										
E146(15')	7/20/98 14:33												
E146(25')	7/20/98 14:33												
E146(27.5')	7/20/98 14:33												
E146DP	7/20/98 14:33			-0.2									-3.5E-03
E147	7/20/98 10:42	1.17	0.91										
E148	7/20/98 10:42	1.12	0.97										
E148DP	7/20/98 10:42			-0.6									-2.7E-03

Head difference = tapedown water level inside piezometer/well - tapedown water level outside piezometer/well. Reference is top of piezometer/well casing. Correction for bias: 0.3 cm added to inside tapedown if drivepoint diameter < 1.25".
Shaded cells indicate water depths were calculated by applying an offset to staff data.
Outlined cells indicate the result was flagged (e.g. value excessively low or high, not in keeping with history, etc.) and is suspect.

Table VII-2. Water Levels and Hydraulic Gradients: July 20-22, 1998 Page 2 of 2

Site ID	Water Level Observation Date	Staff (feet)	Water Depth (feet)	Head Diff.* (cm)	Water Level Observation Date	Staff (feet)	Water Depth (feet)	Head Diff.* (cm)	Water Level Observation Date	Staff (feet)	Water Depth (feet)	Head Diff.* (cm)	Avg. Hyd. Gradient (downward positive)
E121	7/20/98 9:50	2.88	1.07						7/22/98 13:01		1.42		
E123-FW									7/22/98 12:17		1		
E123-NN					7/21/98 15:39		0.88						
E123-NW					7/21/98 15:39		0.83						
E124	7/20/98 9:55	1.09	0.86						7/22/98 12:07	1.16	1		

Head difference = tapedown water level inside piezometer/well - tapedown water level outside piezometer/well. Reference is top of piezometer/well casing. Correction for bias: 0.3 cm added to inside tapedown if drivepoint diameter < 1.25".
Shaded cells indicate water depths were calculated by applying an offset to staff data.
Outlined cells indicate the result was flagged (e.g. value excessively low or high, not in keeping with history, etc.) and is suspect.

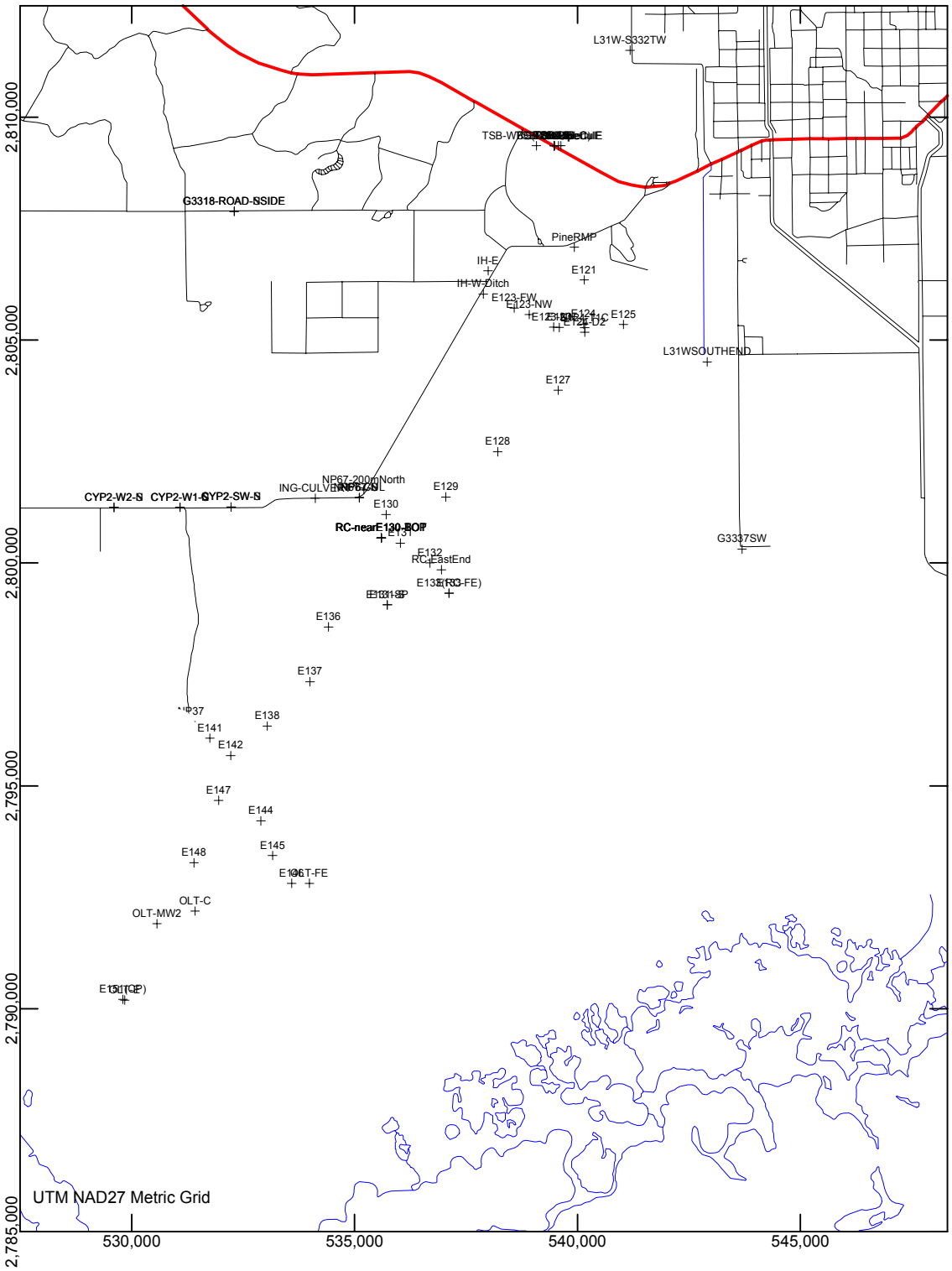

Figure VII-1. Surface-water monitoring sites: July 20-23, 1998.

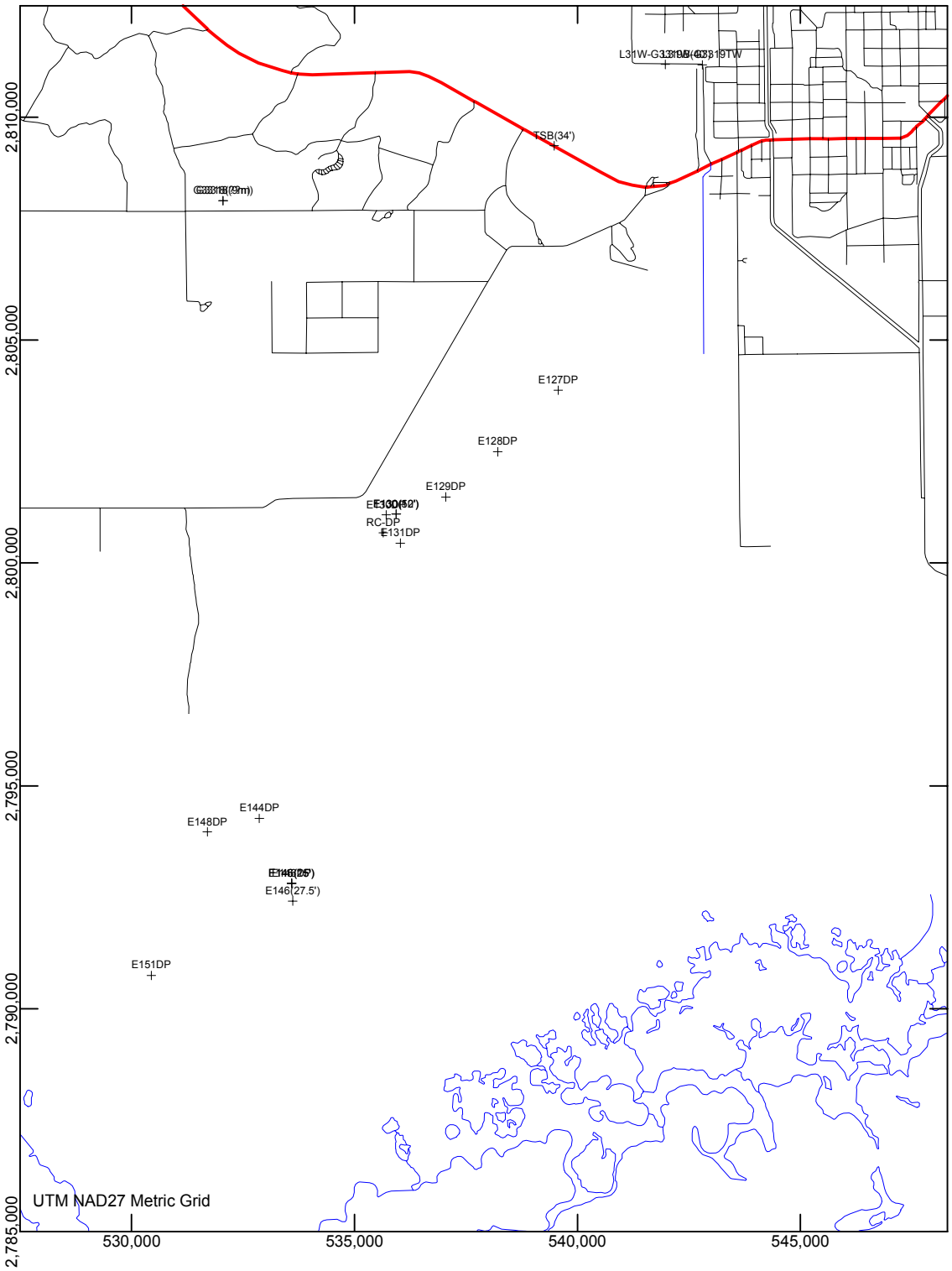

Figure VII-2. Ground-water monitoring sites: July 20-23, 1998.

APPENDIX VIII

Data Collected in Taylor Slough and Vicinity between

September 20 and October 5, 1999

Table VIII-1. Chemical Analyses From Research Site Locations: September 20-October 5, 1999 Page 1 of 2

Site ID	Site Type	Date	Field Parameters					Lab Spec. Cond. (µS)	Color (Pt/CO)	Ca (mg/L)	Na (mg/L)	Mg (mg/L)	SiO2 (mg/L)	Cl (mg/L)	Alk. as CaCO3 (mg/L)	SO4 (mg/L)	Br (mg/L)	Cation/ Anion Balance* (%)	Ammonium (µM)	Phosphate (µM)	δ^2H (‰)	$\delta^{18}O$ (‰)
			Temp. (°C)	pH	DO (mg/L)	ORP (mV)	Spec. Cond. (µS)															
								M.D.L.		0.02	0.1	0.001	0.01	0.1	1	0.2	0.05		0.05	0.05		
AEROJETCANAL	sw	9/22/99 0:00						302		45	15	2.9	3.4	22	122	1	0.05	1.14				
C111-W	sw	9/22/99 0:00						505		73	24	5.7	5	36	203	8.9	0.1	0.20				
C111-S18C	sw	9/22/99 7:55		7.11				524		82.3	21.7	5.22		32.4	202.3							
E121	sw	9/23/99 8:39	27.4	7.59			336	316		47	19	4.1	5	30	128	0.8	0.05	1.43				
E124	sw	9/23/99 8:49	27.5	7.38			297															
E127	sw	9/23/99 8:59	27.7	7.59			240	229		39	8	2.2	4.6	11	103	0.2	0.05	2.16				
E128	sw	9/23/99 9:10	27.6	7.62			219															
E129	sw	9/23/99 9:23	28.6	7.62			210	229		38	6.4	1.8	3.1	9.5	105	0.2	0.05	-0.97				
E130	sw	9/23/99 9:45	27.4	7.65			215	223		43	3.5	1.8	2.5	6.2	110	0.2	0.05	1.48				
E131	sw	9/23/99 9:38	27.6	7.58			201															
E135	sw	9/23/99 10:25	27.8	7.17			185	195		34	4.4	1.6	3	6.5	92	0.2	0.05	-0.10				
E136	sw	9/23/99 10:35	28.1	7.79			209															
E137	sw	9/23/99 10:45	28.2	7.67			221															
E138	sw	9/23/99 10:50	28.8	7.74			239															
E142	sw	9/23/99 11:00	28.1	7.6			269															
E146	sw	9/23/99 13:10	29.9	7.65			252	258		45	9.2	2.4	4.5	13	117	0.2	0.05	2.46				
E147	sw	9/23/99 11:22	28.7	7.8			242	250		45	6.1	1.9	2.7	11	115	0.2	0.05	1.08				
E148	sw	9/23/99 12:05	29.0	7.73			227															
E149	sw	9/23/99 12:15	29.1	7.74			245															
E151(CP)	sw	9/23/99 12:40	28.9	8.22			185															
E151(CP)NEARWELL	sw	9/23/99 0:00						197		25	12	2.5	2.6	20	67	0.2	0.05	1.81				
EW-23	sw	9/20/99 0:00	31.1	8			298															
EW-24	sw	9/20/99 0:00	31.2	8.02			312															
EW-25	sw	9/20/99 0:00	30.7	7.69			317															
EW-26	sw	9/20/99 0:00	31.7	8.18			326															
EW-27	sw	9/20/99 0:00	29.3	7.57			341	331		45	19	3.5	4.2	30	125	0.2	0.05	0.21				
EW-28	sw	9/20/99 0:00	31.2	7.96			331															
EW-29	sw	9/20/99 0:00	31.3	7.85			341															
EW-29-1	sw	9/20/99 0:00	29.6	7.51			469	459		49	36	5.7	3.7	68	128	1.4	0.1	-0.08				
EW-29-2	sw	9/20/99 0:00	30.0	7.6			440															
EW-29-4	sw	9/20/99 0:00		7.66			450															
EW-TRAN-HARRY	sw	9/22/99 0:00						452		69	20	4.9	4.7	31	186	7.5	0.05	0.77				
Joe Bay 1E	sw	10/5/99 11:50		7.99				2420	20	49	370	43	4.5	660	140	83	2.1	0.14				
Joe Bay 2E	sw	10/5/99 11:15		8.03				686	20	45	84	12	4.9	120	145	12	0.3	3.90				
Joe Bay 5C	sw	10/5/99 10:00		7.93				545	10	36	56	8.5	3.5	99	110	7.8	0.2	-1.16				
Joe Bay 6W	sw	10/5/99 6:30		7.98				513	10	37	49	8.1	4	89	111	7.7	0.2	-1.49				

Blank cells indicate no sample, no measurement, no analysis or that the measurement was not applicable at that site.
Outlined 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 is calculated using milliequivalents as (cations-anions)/(cations+anions)*100.
Results below the minimum detection limit (M.D.L.) are listed as the M.D.L.

Table VIII-1. Chemical Analyses From Research Site Locations: September 20-October 5, 1999 Page 2 of 2

Site ID	Site Type	Date	Field Parameters					Lab Spec. Cond. (µS)	Color (Pt/CO)	Ca (mg/L)	Na (mg/L)	Mg (mg/L)	SiO2 (mg/L)	Cl (mg/L)	Alk. as CaCO3 (mg/L)	SO4 (mg/L)	Br (mg/L)	Cation/ Anion Balance* (%)	Ammonium (µM)	Phosphate (µM)	δ^2H (‰)	$\delta^{18}O$ (‰)
			Temp. (°C)	pH	DO (mg/L)	ORP (mV)	Spec. Cond. (µS)															
								M.D.L.		0.02	0.1	0.001	0.01	0.1	1	0.2	0.05		0.05	0.05		
Joe Bay 8W	sw	10/5/99 8:30		8.02				704	30	42	89	12	4.9	130	134	12	0.3	3.91			-3.8	-0.7
L31SOUTHSIDE	sw	9/22/99 0:00						481		75	22	4.8	5.2	34	200	2.1	0.05	1.23				
L31W-S332HW	sw	9/22/99 0:00						475		73	21	4.8	5.3	33	200	2	0.05	0.09				
NP37	sw	9/27/99 14:40		8.4				203	10	30.8	6.4	1.93		11.4	83.9							
NP67-N	sw	9/22/99 0:00						190		35	3	1.3	2.1	5.3	90	0.3	0.05	0.85				
NP67-S	sw	9/22/99 0:00						167		29	2.8	1.2	2	5.2	78	0.2	0.05	-1.18				
NS-1	sw	9/20/99 0:00		7.37			471	460		69	22	4.9	4.7	35	190	3	0.05	-0.02				
NS-10	sw	9/20/99 0:00	27.2	7.93			321	315		40	19	4	3.6	29	117	1.5	0.05	-0.24				
NS-11	sw	9/20/99 0:00	27.5	7.95			297															
NS-12	sw	9/20/99 0:00	27.4	8.01			287															
NS-13	sw	9/20/99 0:00	27.7	8.04			266															
NS-14	sw	9/20/99 0:00	28.0	8.12			256															
NS-14BACKUP	sw	9/22/99 0:00						214		29	12	2.8	2.6	17	84	0.3	0.05	0.89				
NS-15	sw	9/20/99 0:00	28.7	7.94			276															
NS-16	sw	9/20/99 0:00	28.3	8.08			267															
NS-17	sw	9/20/99 0:00	29.0	7.96			291	284		38	16	3.4	3.3	24	109	0.2	0.05	0.26				
NS-18	sw	9/20/99 0:00	29.4	8.02			303															
NS-19	sw	9/20/99 0:00	30.2	8.12			290															
NS-1BACKUP	sw	9/22/99 0:00						466		71	23	5.1	5.7	34	195	2.3	0.05	0.92				
NS-2	sw	9/20/99 0:00		7.37			408															
NS-20	sw	9/20/99 0:00	30.2	7.82			300															
NS-21	sw	9/20/99 0:00	30.3	8.15			282															
NS-22	sw	9/20/99 0:00	30.7	8.12			289	284		37	17	3.3	4.1	26	105	0.2	0.05	0.42				
NS-3	sw	9/20/99 0:00	26.9	7.53			408															
NS-4	sw	9/20/99 0:00	26.8	7.74			387															
NS-5	sw	9/20/99 0:00	26.9	7.7			380	375		50	22	4.6	3.9	34	140	1.6	0.05	0.82				
NS-6	sw	9/20/99 0:00	27.3	7.82			369															
NS-7	sw	9/20/99 0:00	27.4	7.78			362															
NS-8	sw	9/20/99 0:00	27.4	7.94			344															
NS-9	sw	9/20/99 0:00	27.5	7.89			333															
NWOFE130NP67	sw	9/23/99 0:00						1410		25	2.7	1.2	2.2	4.7	66	0.2	0.05	0.35				
S-175	sw	9/29/99 9:25		7.23				500	9	79.8	22.3	4.7		33.1	200.4							
Stillwater Creek	sw	10/5/99 13:00		8.1				4010	20	58	640	71	4.6	1200	155	140	0.05	-1.80			-1.6	-0.28
TSB-UE	sw	9/22/99 0:00						244		45	15	3.3	6	22	124	0.6	0.05	1.06				
Upstream Taylor River	sw	10/5/99 9:45		7.72				657	50	35	71	11	3.2	120	114	10	0.3	0.03			-2.6	-0.68
West Highway Creek	sw	10/5/99 13:30		8.2				874	20	54	96	15	4.7	160	167	22	0.4	0.60				

Blank cells indicate no sample, no measurement, no analysis or that the measurement was not applicable at that site.
Outlined 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 is calculated using milliequivalents as (cations-anions)/(cations+anions)*100.
Results below the minimum detection limit (M.D.L.) are listed as the M.D.L.

Table VIII-2. Water Levels and Hydraulic Gradients: September 20-23, 1999

Site ID	Site Type	Water Level Observation Date	Staff (feet)	Water Depth (feet)	Head Diff. (cm)	Hyd. Gradient (downward positive)
E121	sw	9/23/99 8:39	3.68	1.83		
E124	sw	9/23/99 8:49	1.83	1.71		
E127	sw	9/23/99 8:59	3.29	1.63		
E128	sw	9/23/99 9:10	3.16	2.21		
E128DP	dp	9/23/99 9:10			-0.25	-1.12E-03
E129	sw	9/23/99 9:23	3.08	1.96		
E129DP	dp	9/23/99 9:23			0	0
E130	sw	9/23/99 9:45	2.94	1.54		
E130(10')	gw	9/23/99 9:45			-3	-9.84E-03
E130(52')	gw	9/23/99 9:45			-2.5	-1.58E-03
E130DP	dp	9/23/99 9:45			0	0
E131	sw	9/23/99 9:36		2.75		
E131DP	dp	9/23/99 9:36			0	0
E135	sw	9/23/99 10:25	2.78	1.58		
E136	sw	9/23/99 10:35	2.63	1.92		
E137	sw	9/23/99 10:45	2.5	1.42		
E138	sw	9/23/99 10:50	2.37	1.38		
E142	sw	9/23/99 11:00	2.38	1.83		
E146	sw	9/23/99 13:10	2.28	1.63		
E146DP	dp	9/23/99 13:10			4.3	7.58E-02
E147	sw	9/23/99 11:22	2.25	1.92		
E148	sw	9/23/99 12:05	2.28	2.13		
E149	sw	9/23/99 12:15	2.3	1.92		
E151(CP)	sw	9/23/99 12:40	2.37	2.21		
EW-23	sw	9/20/99 0:00		0.83		
EW-24	sw	9/20/99 0:00		1		
EW-25	sw	9/20/99 0:00		0.79		
EW-26	sw	9/20/99 0:00		0.67		
EW-27	sw	9/20/99 0:00		0.92		
EW-28	sw	9/20/99 0:00		1		
EW-29	sw	9/20/99 0:00		0.58		
EW-29-1	sw	9/20/99 0:00		1		
NS-1	sw	9/20/99 0:00		1.5		
NS-10	sw	9/20/99 0:00		0.92		
NS-11	sw	9/20/99 0:00		0.67		
NS-12	sw	9/20/99 0:00		0.83		
NS-13	sw	9/20/99 0:00		0.71		
NS-14	sw	9/20/99 0:00		0.5		
NS-15	sw	9/20/99 0:00		0.46		
NS-16	sw	9/20/99 0:00		0.38		
NS-18	sw	9/20/99 0:00		0.42		
NS-19	sw	9/20/99 0:00		0.5		
NS-2	sw	9/20/99 0:00		1.5		
NS-20	sw	9/20/99 0:00		0.71		
NS-21	sw	9/20/99 0:00		0.67		
NS-22	sw	9/20/99 0:00		0.75		
NS-3	sw	9/20/99 0:00		1.17		
NS-4	sw	9/20/99 0:00		1.1		
NS-6	sw	9/20/99 0:00		0.25		
NS-7	sw	9/20/99 0:00		0.42		
NS-8	sw	9/20/99 0:00		0.33		
NS-9	sw	9/20/99 0:00		1		

Head difference = tapedown water level inside piezometer/well - tapedown water level outside piezometer/well. Reference is top of piezometer/well casing. Correction for bias: 0.3 cm added to inside tapedown if drivepoint diameter < 1.25".

Shaded cells indicate water depths were calculated by applying an offset to staff data.

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

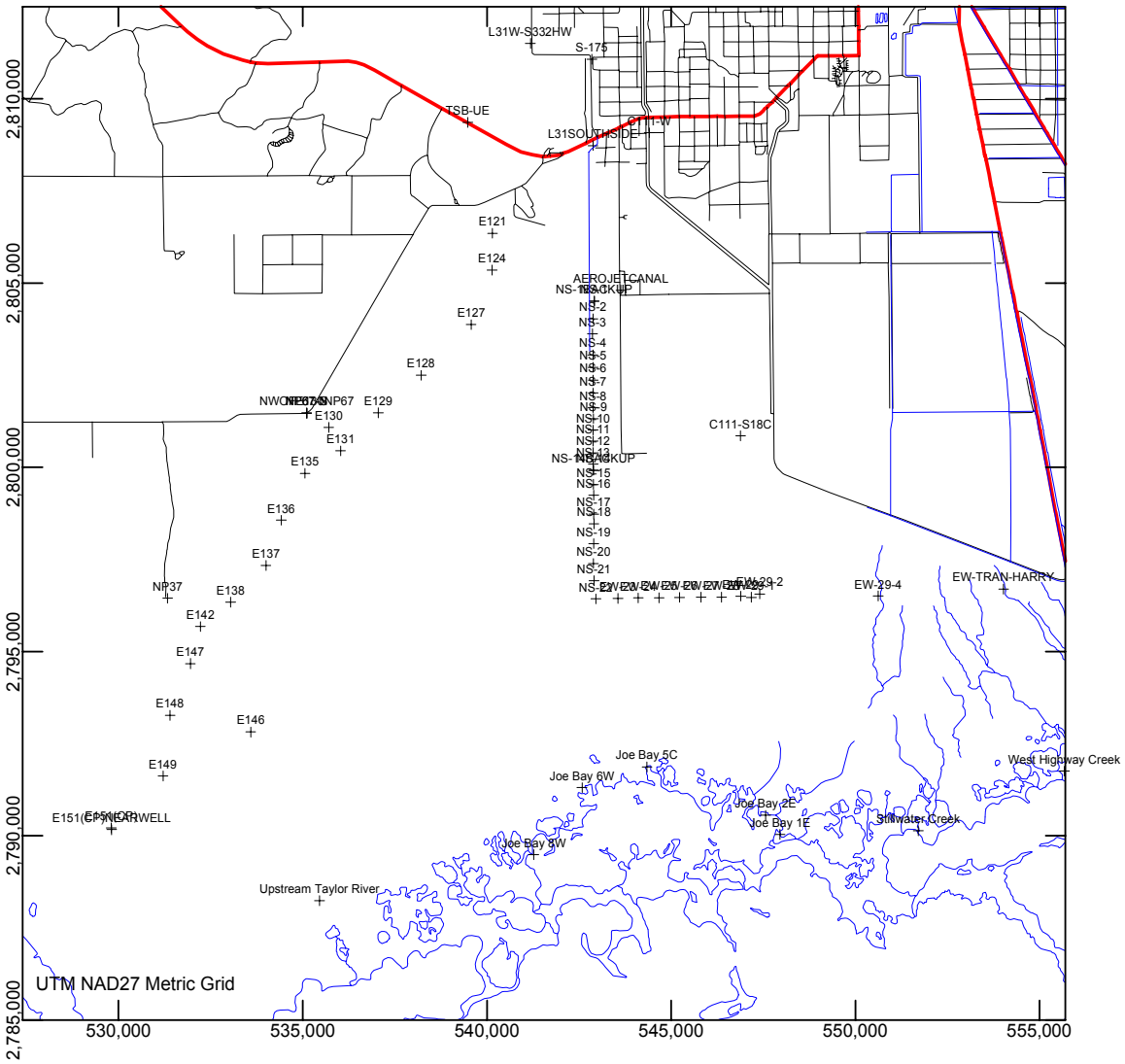

Figure VIII-1. Surface-water monitoring sites: September 20-October 5, 1999.

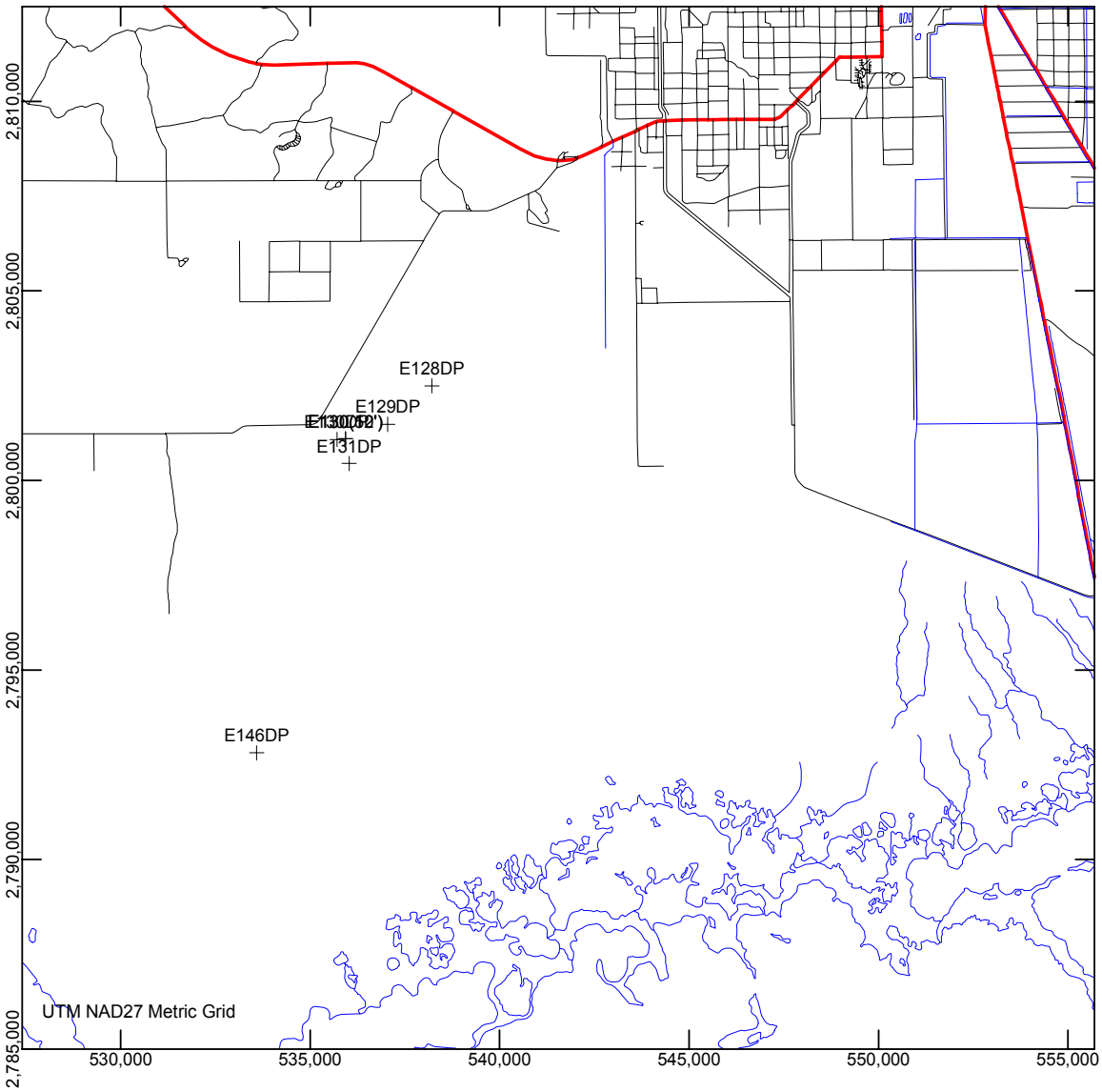

Figure VIII-2. Ground-water monitoring sites: September 20-October 5, 1999.

APPENDIX IX

Data Collected in Taylor Slough and Vicinity between

October 25 and 28, 1999

Table IX-1. Chemical Analyses From Research Site Locations: October 25-28, 1999

Site ID	Site Type	Date	Field Parameters					Lab Spec. Cond. (µS)	Color (Pt/CO)	Ca (mg/L)	Na (mg/L)	Mg (mg/L)	SiO2 (mg/L)	Cl (mg/L)	Alk. as CaCO3 (mg/L)	SO4 (mg/L)	Br (mg/L)	Cation/ Anion Balance* (%)	Ammonium (µM)	Phosphate (µM)	δ^2H (‰)	$\delta^{18}O$ (‰)
			Temp. (°C)	pH	DO (mg/L)	ORP (mV)	Spec. Cond. (µS)															
								M.D.L		0.02	0.1	0.001	0.01	0.1	1	0.2	0.05		0.05	0.05		
C111-S18C	SW	10/27/99 12:47		7.44				512		79.1	18.7	4.64		30.2	203.9	8.5		1.56				
Joe Bay 1E	SW	10/26/99 11:50		8.05				1800	20	45	250	31	3.3	460	125	59	1.4	-0.73				
Joe Bay 2E	SW	10/26/99 11:25		7.94				506	20	42	43	7.7	3.7	82	125	5.9	0.2	-2.69			-24.6	-3.32
Joe Bay 5C	SW	10/26/99 10:20		8				430	10	41	32	5.9	3.5	58	123	4.1	0.1	-2.49				
Joe Bay 6W	SW	10/26/99 9:50		8				414	10	42	29	5.6	4.1	54	122	3.8	0.1	-2.19				
Joe Bay 8W	SW	10/26/99 9:00		8.08				468	20	43	35	7.2	3.8	66	129	6.1	0.2	-2.56				
NP37	SW	10/25/99 12:56		8.14				258	14	46.9	6.18	1.95		11.1	115.5	0.13		2.73				
S-175	SW	10/27/99 10:15		7.25				453	13	70.2	18.3	3.90		29.2	186.5			0.75				
Stillwater Creek	SW	10/26/99 13:00		8.12				2700	20	49	410	47	3.2	740	128	95	2.4	0.05			-22.0	-2.97
Trout Creek	SW	10/26/99 7:50						2100		47	79	37	3.2	560		73	1.8					
TSB-S	SW	10/25/99 14:30		8.2				223	16	39.8	5.78	1.79		8.47	101.2	0.33		2.59				
Upstream Taylor River	SW	10/28/99 10:45		7.63				494	20	36	45	8	3.1	82	111	6.8	0.2	-1.88			-19.8	-2.96
West Highway Creek	SW	10/26/99 13:15		8.26				733	20	54	67	12	4.2	120	168	16	0.3	-1.94				

Blank cells indicate no sample, no measurement, no analysis or that the measurement was not applicable at that site.
Outlined 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 is calculated using milliequivalents as (cations-anions)/(cations+anions)*100.
Results below the minimum detection limit (M.D.L.) are listed as the M.D.L.

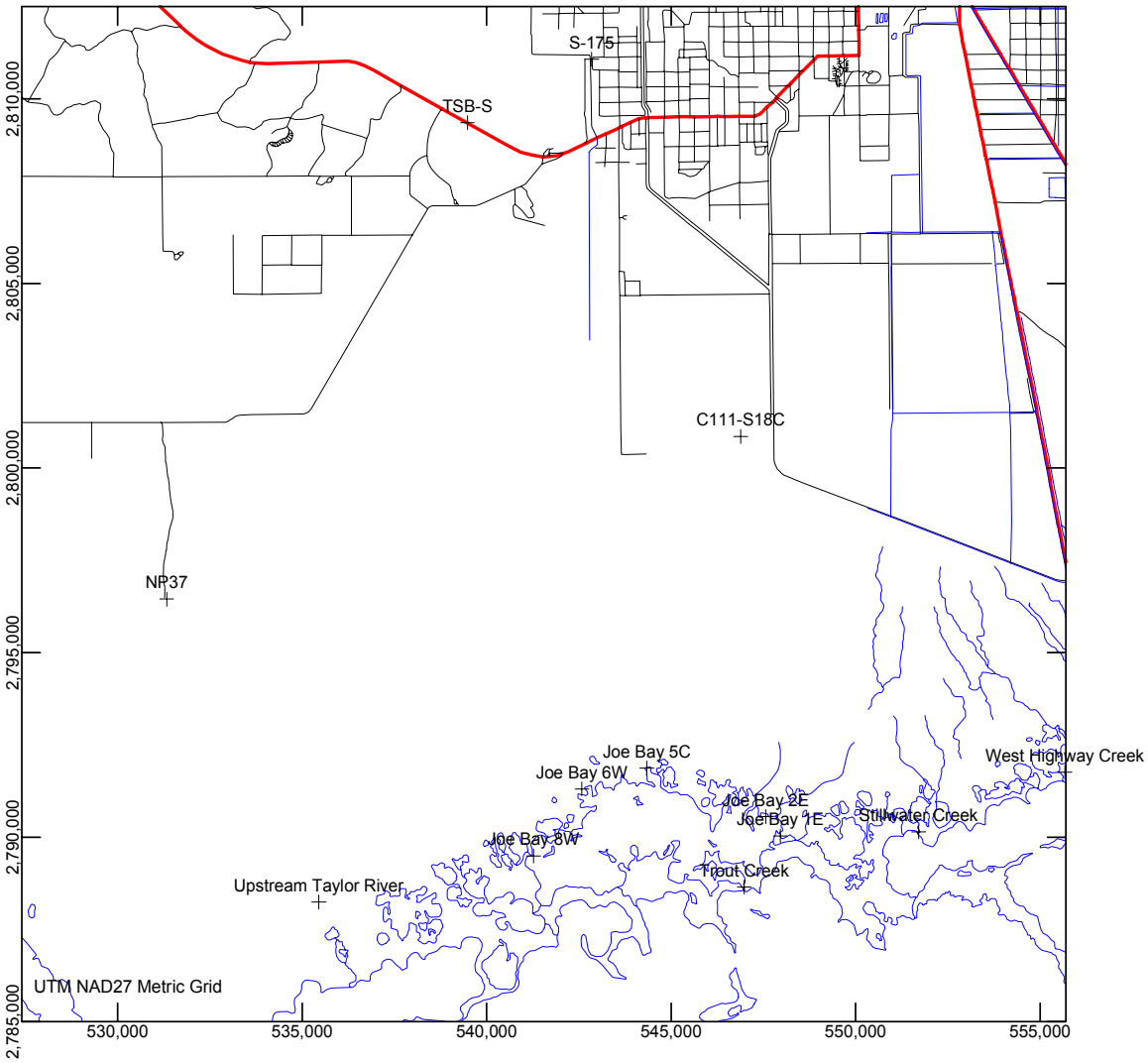

Figure IX-1. Surface-water monitoring sites: October 25-28, 1999.