WELLHEAD PROTECTION PLAN DELINEATION

for

NORTH LAWRENCE WATER CORPORATION
P.O. Box 277
Bedford, Indiana 47421

for submittal to

Indiana Department of Environmental Management

R.E. BLATTERT CONSULTANTS

WELLHEAD PROTECTION PLAN DELINEATION

of

NORTH LAWRENCE WATER CORPORATION
P.O. Box 277
Bedford, Indiana 47421

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Indiana Department of Environmental Management

Prepared by

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February 12, 2001

INDIANA WELLHEAD PROTECTION PHASE I APPLICATION

Instructions - Indicate in the "Applicant Use" column of the checklist the page number or other appropriate reference where the specified information is located.

Delineation Information 327 IAC 8-4.1-7 (per 327 IAC 8-4.1-6, all maps except topographic maps, must be drawn to a scale between 1"=400' and 1"=1,000')	Applicant Use	IDEM Use Only		
North Lawrence Water Corp. P.O. Box 277 Bedford, IN 47421	Location in Application Packet	Information Present? (Yes, no, N/A)	Reviewer	Item #
(a) Requires a report with a narrative description of the regional hydrogeologic setting, the conceptual model, and modeling efforts which includes:				
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(ii) water levels;	Appendix 2			5
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(iv) pumping wells with screened intervals;	Appendix 2			7
(D) Well logs and records used in cross section development;	Appendix 2			8
(E) Map(s) of the proposed WHPA illustrating:				
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WELLHEAD PROTECTION AREA DELINEATION

Rule 327 IAC 8-4.1-7 (a)

NORTH LAWRENCE WATER CORPORATION

Introduction

This Wellhead Protection Delineation Report has been prepared on behalf of the North Lawrence Water Corporation, Bedford, Indiana. The report contains a narrative description of the regional hydrogeological setting, conceptual model and modeling effort, research conclusions, appropriate maps, cross-sections, well logs, and data review. The report is formatted, item-by-item, in response to IDEM Phase 1 Requirements, pages 2 through 4 (of 6), *Items #1 through #33.*

1 Analysis of Hydrogeological Setting and Conceptual Model *(Item 1)*

1 A Map of Area of Interest *(Item 2)*

The map included in Appendix 1 is intended to geographically and topographically display the area surrounding the North Lawrence wellfield in Spice Valley Township, Lawrence County, Indiana. The wellfield is found approximately five miles southwest of the Town of Bedford, on the floodplain north of East Fork White River, approximately 2 ½ miles north of State Road 50 near Bryantsville, in the NW ¼ Sec. 11, T 4 N, R 2 W. The map should serve as a point of reference to locate the site within the state, and the wellfield area with respect to the City of Bedford, Indiana.

1 B Review of Published Hydrogeologic and Geologic Interpretations *(Item 3)*

The flat surface topography in the vicinity of the wellfield is documented as the valley of East Fork White River (USGS Bedford West Quad, 1993). The pre-ice-age surface is shown to be buried beneath up to nearly 90 feet of glacial outwash and alluvial sediments (Gray, 1982). The limestone bedrock contour in the vicinity of Bedford is reflective of the surface features. The Paoli Limestone caps the hills, the Saint Genevieve Limestone forms the side slopes, and the Saint Louis Limestone forms the toe of the slopes. These formations are included in the Blue River Group of Mississippian Age (Shaver, 1970).

Below the Blue River Group, is the Sanders Group where its uppermost member, the Salem Limestone (a.k.a. the "Bedford Stone", and the "Indiana Limestone"). The Salem Limestone is found at the basal level of the outwash aquifer at the wellfield, where the outwash valley is said to be cut into the formation (Shaver, 1970). The gently rolling landscape developed on the eroded outcrop of the uplands is called the "Mitchell Plain," the most cavernous exposed surface in Indiana. In comparison, the buried Bluffton Plain of northern Indiana may be as cavernous and well developed, but it is buried by as much as three hundred feet of glacial deposits, and thus unavailable for study. The physiography of the Bedford area causes drainage of the uplands to go largely underground, as is typical in karst topography. But, in the area of the well field, the depth of downward groundwater movement is to the base of the outwash valley fill, at its contact with the Salem Limestone. As judged by the results of pump tests conducted at the wellfield, the Salem Limestone appears to terminate downward movement of ground water.

Bluespring Caverns, 2 miles east of the wellfield, have been explored by others and mapped as more than a 20-mile system. The Colglazier Cave, on the Colglazier property, is the main entry to the system. The cave, and its entry, is located east of the North Lawrence wellfield at the site of a hospitality building, on the opposite side of the East Fork White River. The Bluespring system discharges into the river, down gradient from the wellfield. Boulton Sink, a.k.a. Stumphole Cave, is an up gradient entry to the cave system. This entry is reported to be only about 50 feet deep, and would not be seen as discharging into the outwash aquifer. Boulton Sink is mapped as a northwest entry and passage to the Bluespring Caverns, leading to Colglazier Cave (Powell, 1961).

The unconsolidated deposits above the bedrock have slightly smoothed the bedrock features; thickest in the deep outwash-filled valleys, and thinner above the eroded ridge tops (Gray, 1983). The glaciers are not recorded as having reached Spice Valley (Gray, 1989), but melt water from the receding ice north and east of the county are shown to have carried sand and gravel outwash in braided streams away from the ice fronts. These outwash sand and gravel deposits are the source of aquifers throughout the area within the deeper valleys. Some of the bedrock valleys show evidence of being scoured of older Illinoisan outwash and deepened by the younger Wisconsin outwash. The younger valley segments were often narrower than the widened Illinoisan valley segments, and in those narrow segments such as the subject Spice Valley wellfield, coarse materials were deposited at higher velocities, and became prime aquifers.

Numerous published hydrogeologic and geologic interpretations of the area are available and were used in our analysis of the area. Among them:

Back, W., Rosenshein, J.S., Seaber, P.R., 1988, The Geology of North America, Vol. O-2, HYDROLOGY, The Geological Society of America, provides a discussion of glacial landscapes and their complex mixture of sediment types

Blanford, T. Neil, Yu-Shu Wu, 1993, Addendum to the WHPA Code Version 2.0 User's Guide, U.S. Environmental Protection Agency, this latest version (2.2) of the WHPA Code provides the guideline for use of the WHPA model

Blattert, R.E., Nowacki, J.A. 1995, Modern Ohio River Valley Anomalies at the Pre-Pleistocene Drainage Divides Between Cincinnati, Ohio and Ashland Kentucky, Abstracts with Programs, 29th Annual North Central Section/South Central Section, Geological Society of America, provides an understanding of the depositional processes up-gradient and down-gradient of bedrock anomalies under riverbeds in the glaciated environment

Clark, G. D., 1980, The Indiana Water Resource, State of Indiana The 1980 report to the governor, "The Indiana Water Resource" edited by G. Douglas Clark, documents the sand and gravel aquifer as one capable of yielding in excess of 100 gpm from vertical wells

Fenelon, J.M., Bobay, K.E., et al, 1994, Hydrogeologic Atlas of Aquifers in Indiana, United States Geological Survey. The atlas describes water-bearing units within 12 river basins in Indiana. Joseph M. Fenelon and Theodore K. Greeman authored the description of the East Fork White River basin, providing an aquifer description through our area of interest. Likewise, the publication confirms the existence of the alluvial aquifer within the basin, and addresses the bedrock surface within the valley

Fetter, C. W., 1994, Applied Hydrogeology, Prentiss-Hall, Inc., provides the source of empirical hydrologic values for aquifer analysis

Geoscience Research Associates, Inc., 1982, Hydrogeologic Atlas of Indiana for USEPA, Underground Injection Control Program, by Geoscience Research Associates, Inc., is a source to identify bedrock stratigraphy in Indiana

Gray, H.H., 1961, Geologic Map of the 1^0 x 2^0 Indianapolis Quadrangle, Indiana, showing bedrock and unconsolidated deposits, Indiana Department of Natural Resources

Gray, H. H., 1970, Indiana Department of Natural Resources Regional Geologic Map (Vincennes Sheet, Part A). Displays stratigraphy in area of interest

Gray, H. H., 1982, Map of Indiana showing Topography of the Bedrock Surface, Indiana Department of Natural Resources. Displays bedrock topography within area of interest

Gray, H. H., 1983, Map of Indiana showing Thickness of Unconsolidated Deposits, Indiana Department of Natural Resources. Displays the thickness of unconsolidated deposits within the area of interest

Gray, H. H., 1989, Quaternary Geologic Map of Indiana, Indiana Department of Natural Resources. Displays surficial deposits within the area of interest

Haitjema, H.M., 1995, Analytic Element Modeling of Groundwater Flow, Academic Press, describes analytic element methods and the use of analytic solutions to solve groundwater flow problems. The text is a source of knowledge for groundwater flow systems, and modeling techniques

Hoffer, R., 1993, Guidelines for Delineation of Wellhead Protection Areas, United States Environmental Protection Agency

Indiana Department of Natural Resources, Division of Water, 1996, Open File, Well logs

Indiana Department of Natural Resources, 1999, open file well logs within the area of interest

Indiana State Land Office, 1986, Air photo Sheet 03-07 Lawrence County 1" = 400' series provides interpretative information about the floodplain

Layne Northern Company, 1979, Aquifer Test Analysis, is an engineer's analysis of pumping test data, which serves to confirm hydraulic conductivity and transmissivity parameters for the aquifer system of interest

McCaffery, L., Hoover M.E., et al, 1995, Indiana Wellhead Protection Program, Indiana Department of Environmental Management

Powell, R.L., 1961, Caves of Indiana, Indiana Geological Survey, is our source of knowledge about the caves and karst of Lawrence County

Rosenshein, J.S., "Alluvial Valleys", 1988, The Geology of North America, presents a thorough discussion of hydraulic flow in alluvial aquifers

Schneider, A. F., 1966, Physiography in Natural Features of Indiana, Indiana Academy of Science is a source of knowledge in recognizing physiographic features in Indiana

Shaver, R.H., et al, 1970, Compendium of Rock Unit Stratigraphy in Indiana, Geological survey Bulletin 43, Indiana Department of Natural Resources is our source of bedrock stratigraphy knowledge of the area of concern

Spaulding, B., 1997, State Source Water Assessment and Protection Programs Guidance, Office of Water, United States Environmental Protection Agency

United States Geological Survey, 1993, Bedford West Quadrangle, Indiana-Lawrence County, 7.5-minute series, United States Department of the Interior

United States Geological Survey, 1974, Hydrologic Unit Map, State of Indiana, United States Department of the Interior, is a source of stratigraphic information

United States Soil Conservation Service, Thomas, J. A., 1985, Soil Survey of Lawrence County, Indiana, United States Department of Agriculture, is our source of surface soil information

Wayne, W.W., 1963, Pleistocene Formations in Indiana, Geological Survey Bulletin 25, Indiana Department of Conservation, is a source of knowledge to interpret outwash deposition

Walker, E. H. 1957, The Deep Channel and Alluvial Deposits of the Ohio Valley in Kentucky, Geological Survey Water supply Paper 1411 USGS is a good source of the geologic depositional processes within the glaciated uplands of the north central U.S.

Woessner, William, 2000, Stream and Fluvial Plain Ground Water Interactions: Rescaling Hydrogeologic Thought, GROUND WATER, May-June, 2000, presents a discussion of stream stage, channel orientation and ground water exchange in the fluvial setting, is our source of ground water flow interpretation within a floodplain

Wolman, M. G., Riggs, H. C., 1990, Surface Water Hydrology, Geological Society of America, Inc., is an additional source of ground water flow interpretation within a flood plain.

1 C Geologic Cross Sections

A cross-section of the area of interest, as displayed in Appendix 2, was created to aid in the geologic interpretation and conceptual model development. Included is a south to north trending section that extends through the North Lawrence wellfield and local wells serving farms and homesteads. The cross section displays:

(i) The hydrostratigraphic units (the aquifer) *(Item 4)*
(ii) An interpretation of the water table *(Item 5)*
(iii) The relationship of surface water features, to the aquifer *(Item 6)*
(iv) The pumping wells and screened intervals within the cross section *(Item 7)*

The wellfield cross section was drawn from data obtained from the Bedford West USGS 7.5 Minute Series Topographic Map, and IDNR official well records. Bedrock topography was obtained from official well records, and from H. H. Gray's referenced 1982 IDNR "Bedrock Topography Map", Henry Gray's referenced 1983 IDNR "Thickness of Unconsolidated Deposits Map", and the referenced Groundwater Atlas (Fenelon, et al, 1994).

1 D Well Logs and Records Used to Develop Cross Sections *(Item 8)*

The well logs available from the DNR, Division of Water, were obtained from within the West Bedford quadrangle. All of the well logs were reviewed and, when possible, the approximate locations for wells not previously located by the DNR were found. Review of these data indicates that very few wells have been drilled in the outwash basin in the vicinity of the North Lawrence wellfield. Copies of well logs used in developing the cross sections, and located within in the area of interest are provided in Appendix 3.

1 E Maps of the Proposed WHPA

(i) Location of CPWSS Wells *(Item 9)*

A review of files in the DNR High Capacity Section was completed to locate all community public water supply system (CPWSS) wells, and non-public wells, registered within the area of interest. The North Lawrence Water Corporation uses three wells. See Appendix 3 for well logs.

(ii) High Capacity Wells Registered as Significant Withdrawal Facilities *(Item 10)*

No other CPWSS wells are located in the near vicinity of the North Lawrence wellfield.

(iii) Surface Water Features *(Item 11)*

The wellfield lies within the East Fork White River drainage basin. Several small streams drain the basin, most notably Salt Creek and Leatherwood Creek. These, and smaller streams exhibit fairly steep gradients to move water across the basin. Otherwise, sinkholes largely contribute to the collection of runoff. See Appendix 4 for display of surface water features

(iv) Thickness and Extent of Hydrostratigraphic Units *(Item 12)*

Two significant aquifers are encountered in this region:

1) the outwash sand and gravel aquifer, and
2) the carbonate bedrock aquifer.

The alluvium is formed of the silty clay loam soils on the surface of the floodplain of the East Fork White River (USDA, 1985). Below the alluvium, the mixed clay, sand, gravel and boulders that fill the buried bedrock valley forms the outwash aquifer. The erosion of the hard limestone formed the valleys, both by stream down cutting and, at the higher elevations, by dissolution along the joints and fractures in the limestone (Powell, 1961). The accumulated deposit is at least 94 feet thick over the deep profile of the buried bedrock valley (Open Well Logs, 1999). The upland area above the wellfield is a limestone terrain that hosts the other hydrostratigraphic unit, the "carbonate bedrock" aquifer. The Blue River Group outcrops above the East Fork White River where the surface of the limestone is more than 200 feet above the river. Karst topography has developed in this formation as a result of its exposure to erosional forces. Numerous caves and thousands of sinkholes are known to be within ten miles of this well field, in the elevated limestone. The depth of cavern development is controlled by the ground water base level in the carbonate aquifer where karst occurs above the level of the outwash valley floor (Powell, 1961). The map displaying the thickness and extent of the units is found in Appendix 4.

(v) Regional Groundwater Levels *(Item 13)*

The ground water within the drainage basin can be segregated into two levels:

1) Shallow Water Level
2) Deep Water Level

The shallow water level is perched in the surficial sand and gravel deposits of alluvial origin. The perched water level reflects the topography of the floodplain, and overlies the outwash deposit. The perched water level is maintained by the very flat, exposed surface of the unconsolidated

material, and recharged by the nearly forty inches of annual precipitation. As described by the United States Department of Agriculture, Lawrence County Soil Survey (USDA,1985), the water table is found within one -foot of the ground surface in Newark soil, and within one foot to three feet of the ground surface within Petrolia soil.

The Deep Water Level lies within the outwash deposit, recharged from within the regional drainage basin. The water level reported in the initial exploration survey of the North Lawrence wellfield revealed that the pre pumping water level was near or below the apparent level of the East Fork White River. The gradient of the river is reasonably steep, showing approximately 10 feet of fall along the seven miles displayed on the USGS "West Bedford" 7 1/2 Quadrangle. Regional water levels are likely controlled by the strike and dip of the limestone.

Groundwater levels were determined to the extent possible by review of surface water features established on topographic maps, and review of available water well logs for the area. Of the water well logs obtained from the DNR, Division of Water, twelve wells or test wells installed in the sand and gravel aquifer were evaluated. This data must be interpreted however, since the elevations of the wellheads are not established, and the wellheads extend several feet above land surface. Variations in pumping rates and pumping schedules within the wellfield temporally affect water levels. The installation of additional production wells in the area also temporally affect observed water levels. The map illustrating the interpreted groundwater elevations is presented in Appendix 4.

(vi) Bedrock Topography *(Item 14)*

The bedrock topography was determined from review of the referenced regional bedrock topographic map of the area (Gray, 1982 "Topography of Bedrock Surface, Misc. Map #36), and official IDNR well records. The elevation of the bedrock surface is about 400 feet above mean sea level within the area of the wellfield. These bedrock contour data have been reproduced as displayed in Appendix 4.

1 F Summary of Raw Data Identified and Used for Model Development *(Item 15)*

The raw data utilized in the model is from published sources including: the Indiana Geological Survey; the United States Geological Survey; the USDA Soil Survey; the Indiana Department of Natural Resources, and; the United States Environmental Protection Agency. A hydrologic study was funded and completed as a component of wellfield expansion in 1979, and data from the results of that study was utilized. The available information served to: 1) determine the extent and boundaries of the system; 2) understand the surface water bodies and divides; 3) contour the elevation, extent and thickness of the aquifer base; 4) consider groundwater head, surface water levels and discharge rates; 5) utilize realistic hydraulic conductivity and/or transmissivity distribution, and; 6) consider the spatial and temporal distribution of rates of evapotranspiration, groundwater recharge, surface/groundwater interaction, groundwater pumping, and natural groundwater discharge.

The data items listed above represent a "wish list" and are rarely all available. The lack of some of these data is not cause for alarm as uncertainty can be accounted for in the modeling effort by hypothesis testing.

1 G Discussion of the Hydrogeologic Parameters *(Item 16)*

Input data of the hydrogeologic parameters were obtained from the above stated sources to construct a conceptual model of the groundwater flow system. A discussion of each of the input parameter values obtained from the data review is provided below:

Saturated Aquifer Thickness

Review of available maps and water well logs for the area reveals that an outwash aquifer system is present in the vicinity of the North Lawrence wellfield. The aquifer includes the section of outwash and sandy alluvium below static water level, for an average thickness of 43 feet. Drilling logs show the wells to average 68 feet deep, and show the static water level to be 16 to 18 feet below grade. The aquifer is shown by test wells to become thinner toward the north of the valley, as the bedrock surface begins to rise toward the valley wall.

Transmissivity

Transmissivity of the outwash aquifer was determined from analysis of drawdown data collected from performance pump testing of test wells for a 1979 engineering study conducted by Layne Northern Co. (1979), to evaluate the proposed wellfield. Review of these results indicates that aquifer transmissivity is in the range of 18,000 ft^2/day, the value applied to the model.

Aquifer Porosity

The porosity of a given formation cannot be measured directly. Porosity is typically estimated as a function of aquifer material (i.e. clay, silt, clean sand, gravel, etc.). A review of the literature (Fetter, 1980) suggests porosity values ranging from 15 to 25 percent can be used for this aquifer. The model was conceptualized at 22%.

Hydraulic Gradient

The gradient and ambient groundwater flow direction, in this reach of the river was calculated from the elevation of the reported water level in the East Fork White River. Gradient was found to be a rather flat 0.0001 (0.5 ft/mile), and applied to the conceptual model.

Aquifer Recharge

Aquifer recharge refers to the amount of precipitation that infiltrates the ground and recharges the aquifer. On average, about 40-43 inches of precipitation annually falls this area of the Midwest, with an average 25% reaching the aquifer. Whereas recharge rates cannot be measured directly, recharge rates are high (12 inches/yr) where sandy soils are found at the surface. Likewise, recharge rates are lower (3 to 6 inches/yr) where aquifers are capped by clay rich soil types, and on uplands surrounding the floodplain. Given the predominantly loamy soil on the surface of the floodplain, recharge rates of 12 inches/year were conceptually applied to the basin. The model

was conceptualized with 19" (0.0045 ft/day) of the annual precipitation and runoff to caverns, and ultimately to the river, going to recharge.

Pumping Rates
The wellfield was modeled with a pumping rate of 518,400 gpd (172,800 gpd/well), or 120 gpm/well. The average pumping rate over the past five years (1994-1998) is shown to be 507,000 gpd (169,000 gpd/well), or 117 gpm/well. The 2.5% increase represents the planned production by the North Lawrence Water Company from this wellfield.

1 H Discussion of Groundwater Flow System

The ground water flow system critical to this wellfield includes the upstream point at which the sand and gravel aquifer exhibits sufficient thickness and width to insure an adequate recharge to the wellfield. The well field is entirely within the East Fork White River Basin, where natural recharge to the flow system is from precipitation, enhanced somewhat by discharge from the many caverns in the region. Pumping rates for the 3 registered high capacity water wells are not reported individually. But, as an aggregate, recently reported maximum annual pumping rate averages 352 gpm, generally pumping alternately between the three wells.

(i) Distribution of Recharge *(Item 17)*

The distribution of recharge is primarily related to precipitation intervals. The region underlain by the sand and gravel outwash deposits is permeable, nearly level, and interpreted to receive significant recharge from precipitation and cavern discharge. Given these conditions, a recharge rate of up to 19 inches/year was assigned to the outwash deposits. The surrounding area characterized as karst, shows greater topographic relief yet it contributes significantly to the recharge component as opposed to contributing to surface runoff.

(ii) Current and Planned CPWSS Pumping Rates *(Item 18)*

The Lawrence County Water Corporation utilizes 3 wells having the capability of yielding:

Well #1	550 gpm
Well #2	470 gpm
Well #3	470 gpm
Total	1490 gpm (2.15 mgd)

However, the 5-year average daily pumping rate is recorded at 350 gpm (0.50 mgd), an average of 116 gpm per well. While the wells and pumps are capable of yielding an aggregate 2.15 mgd, that capacity is not planned in the near future. We allowed for planned growth over current average of 0.5 mgd, and conceptually modeled at 420 gpm (0.60 mgd).

Table 1
North Lawrence Water Company Wellfield
Reported Pumping Capacity for 1998 and Anticipated Future Capacity

Well Number	Avg. Capacity (gpm) through 1998	Anticipated Future Capacity (gpm)
1	116	140
2	116	140
3	116	140

(iii) Pumping Rates of Neighboring High Capacity Wells *(Item 19)*

No other registered high capacity wells are found in the area of the North Lawrence wellfield.

2 PRESENTATION AND DISCUSSION OF THE MODELING EFFORT

2 A Rationale for Delineation Method Selected *(Item 20)*

All public water supply systems with average pumping rates of 100,000 gallons per day or more are required, by the Rule, to define the WHPA through analytical, semi-analytical, or numerical modeling. WHPA 2.2, a semi-analytical flow model developed by T. N. Blanford, et. al., 1993. WHPA 2.2 is a homogeneous layer groundwater flow model designed to delineate the capture zone in the presentation of WHP Plans. Following a review of the physical flow system, the WHPA 2.2 model was selected to delineate the North Lawrence wellfield. The aquifer is unconfined, single layered, having local continuity, thereby qualifying the two2-dimensional model WHPA 2.2 as appropriate to calculate the 5-year time-of-travel. This model was designed for the US EPA and has been used regularly as conceptualized here. The classic Darcy equations are machine processed to build the WHPA 2.2 model output. The General Particle Tracking (GPTRAC) module of WHPA 2.2 that was used to calculate the wellhead protection area is part of the latest revision. This newest GPTRAC is capable of delineating time-related capture zones for pumping wells sited in the aquifer, plotting the hydraulic heads under varying hydraulic parameters, and assesses potential interference between wells. This version of the model also allows image wells, which can be used to represent no-flow boundaries present at the edges of irregular valley walls if required. This newest GPTRAC uses INGRAF version 2.15 by Surtasoft to plot pathlines; potentiometric surface contours; and flow nets that show the water migration routes in the aquifer.

2 B Tabulated Summary of Model Input Parameters *(Item 21)*

The following table illustrates the factors implemented or considered in the model: The parameters considered in the modeling effort were: the outwash sand and gravel deposits; bedrock contribution; runoff; the locations of other high capacity wells; and the regional recharge element. Table 2 B below provides a summary and listing of the major model input parameters:

Table 2
Tabulated Summary of Model Input Parameters

Parameter	Maximum	Minimum	Initial Input
Transmissivity	18,000 ft^2/day	10,000 ft^2/day	17,900 ft^2/day
Aquifer Thickness	52 feet	43 feet	43 feet
Aquifer Porosity	0.25	0.10	0.22
Hydraulic Gradient	0.003	0.0001	0.0001
Angle of Flow	270 degrees	180 degrees	210 degrees
Recharge rates	0.0045 ft/day	0.0027 ft/day	0.0045 ft/day
Discharge Rates	80,000 ft^3/day	40,000 ft^3/day	67224 ft^3/day
Boundary Conditions	1 Positive (river)	0 Negative	1

2 C Example Input Files (Item 22)

Table 2B provides a listing of the major parameters implemented in the model but does not include all data considered in the model. A complete listing of all input parameters and associated input values is given in the example input file provided in Appendix 6.

2 D WHPA Maps

(i),(ii),(iii) Domain of Modeled Area, Boundary Location and Reference Point *(Items 23,24,25)*

The model domain is illustrated in Appendix 7. This figure provides the entire model setting including the boundaries and location of the model reference point.

(iv) Modeled Potentiometric Surface *(Item 26)*

The model-generated potentiometric surface is presented in the input file, Appendix 7. This data set was calibrated to the extent possible with the limited reliable water table elevation data.

(v) Resulting WHPA Boundaries *(Item 27)*

Given the above discussed and exhibited conditions associated with the modeled area, the resulting model generated WHPA is as displayed in Appendix 7. The displayed WHPA defines the 5-year TOT for the wellfield.

2 E Discussion of the Model

(i) Assumptions used in Modeling Effort *(Item 28)*

The model domain covers an area 5000 ft x 2500 ft rectangle, 50 rows tall and 50 columns wide, with its up-gradient boundary being under the influence of the water elevation of East Fork White River. Because the regional natural groundwater flow in the outwash sediments is from the north in the East Fork White River stream valley, the wellfield capture zone was expected to be northeast of the wellfield in the buried valley sediments.

To accurately represent the aquifer, the southeast (bottom) and southwest (left) boundaries were placed sufficiently far from the pumping wells to depict the capture zones northeast:

The southeast model coordinate base line (X Axis) runs east, along a line from model origin at East Fork of White River, a distance of 5000 feet. This axis is offset 700 feet, across gradient from wells # 2 and #3 and runs parallel with the flow direction in the river. The model was sized to insure that the upstream edge would reside outside of the 5-year capture zone.

The southwest corner of the model is at the model origin, 2195 feet downstream from well #3.

The western model coordinate base line (y-axis) runs across the river terrace from the origin approximately north 90 degrees for a distance of 2500 feet.

The bedrock is the aquifer of choice in the hills above the wellfield. Many of the bedrock wells produce quantities of water sufficient for domestic purposes, up to 40 gallons per minute, or more in the cavernous zones. The wellfield sand and gravel wells have been successfully test pumped at rates of 500 gallons per minute.

The bedrock hills which define the sides 0f the valley were assumed to be outside of the original modeled general particle tracks in the aquifer area. That assumption proved to be the case and image wells were not required. Other assumptions (typical of single and multiple layer ground water models) assume the aquifer to be fairly homogeneous in the locally modeled layer of the wellfield, with steady and uniform 5-year average ambient groundwater flow direction. Grid placement and orientation are used to angle the ground water flow direction to better represent actual site conditions. It is understood that the short term ground water flow direction varies with stream elevation and pool stage. Wellhead protection plans are based on 5-year TOT; therefore regional values were used to determine the wellhead protection area. Given the stream stage elevations and flow direction of the river near the North Lawrence wellfield, flow gradient is a reasonably constant value. The hydraulic characteristics input to the model included pumping rates, hydraulic gradient, ambient flow direction, transmissivity, aquifer thickness, area recharge and well radius. The regional hydraulic gradient and regional groundwater flow direction were derived from comparing the drilling logs with the elevation contours on the Bedford West USGS topographic map. Transmissivity of 17,918 square feet per day was determined by the multiple pump tests conducted at the wellfield, and engineering study of 1979. The saturated aquifer thickness was conservatively estimated at 43 feet, from IDNR open file well logs, although the North Lawrence wells were drilled to an average 68 feet of depth with static water level averaging 16 feet. The apparent saturated thickness is 52 feet, but the formation was seen to become thinner toward the north, as reported in test holes, causing us to employ a conservative figure for saturated aquifer thickness.

Groundwater monitoring points exist, both at the wellfield and East Fork White River, which are in hydraulic communication with the groundwater. Our conceptual model of the wellhead protection area was accomplished with the historical data, and knowledge of the geology of the

region. Site visits, well measurements, Indiana state land office air photographs, USGS topographic maps, and other resources were used to determine well field conditions.

(ii) Changes Made to Initial Conditions *(Item 29)*

Changes were made to the initial conditions to assess the effects of the natural seasonal changes at the wellfield, and changes in hydraulic selections. Domain of the model was varied to analyze the effects of boundary conditions. A list of changes, their purpose and affects are displayed in Table 4 below:

TABLE 3
Listing of Changes Made to Initial Conditions

Condition Changed	Purpose	Affect of Change
Increased Transmissivity 20%	Assess a more transmissive aquifer	Narrows, but lengthens TOT
Decreased Transmissivity 20%	Assess a less transmissive aquifer	Enlarges the TOT boundary
Increased recharge 20%	Assess effects of parameter choice	Shrinks the TOT boundary
Decreased recharge 20%	Assess effects of parameter choice	Enlarges the TOT boundary
Increased Well Yield 20%	Assess effects of greater pumping	Enlarges the TOT boundary
Decreased Well Yield 20%	Assess effects of less pumping	Shrinks the TOT boundary
Increased porosity 20%	Assess effects of resulting travel times	Shrinks the TOT boundary
Decreased porosity 20%	Assess effects of resulting travel times	Enlarges the TOT boundary

(iii) Calibration Analysis and the Effects of Uncertainty *(Items 30 & 32)*

The model was calibrated to the extent possible with the limited water table elevation data available. Since the quality of this data does not allow for robust calibration, the results of the hypothesis testing outlined above were incorporated into the final delineation boundary. The results of the plots are composited into the presented display to create a comprehensive boundary of the wellfield. The delineated boundary has model uncertainty factored-in and is considered conservative. The protected area is even more conservative given that its landmark boundaries extend beyond those calculated.

(iv) Water Budget *(Item 31)*

WHPA 2.2 is a semi-analytical model. In solving for the underlying differential equations exactly, there are no errors in the computed water balance for the flow model. Water budgets are a potential concern with finite difference models since those models generate an approximation to the differential equations.

WHPA Physical Landmark Boundary

The area delineated by computer modeling does not present a readily recognized boundary. In order to be an effective wellfield protection tool in support of the management, and contingency plans, a recognizable set of physical boundaries are desirable. Therefore, physical landmarks (roads, section lines, streams, etc,) have been selected to define the Wellhead Protection Area. The selected boundary for the protected area is as described and displayed on the map included in Appendix 7

3 PROFESSIONAL CERTIFICATION *(Item 33)*

This report has been prepared by and under the direction of a certified professional geologist, to fulfill the requirements of Indiana's Wellhead Protection Final Rule, 327 IAC 8-4.1-7, for Phase 1 submittal to the Indiana Department of Environmental Management. The staff and associates of R.E. Blattert Consultants, consulting geologists, conducted the delineation on behalf of Midwestern Engineers, Inc., Loogootee, Indiana.

Submitted by,

Robert E. Blattert, CPG, Indiana #645

February 12, 2001

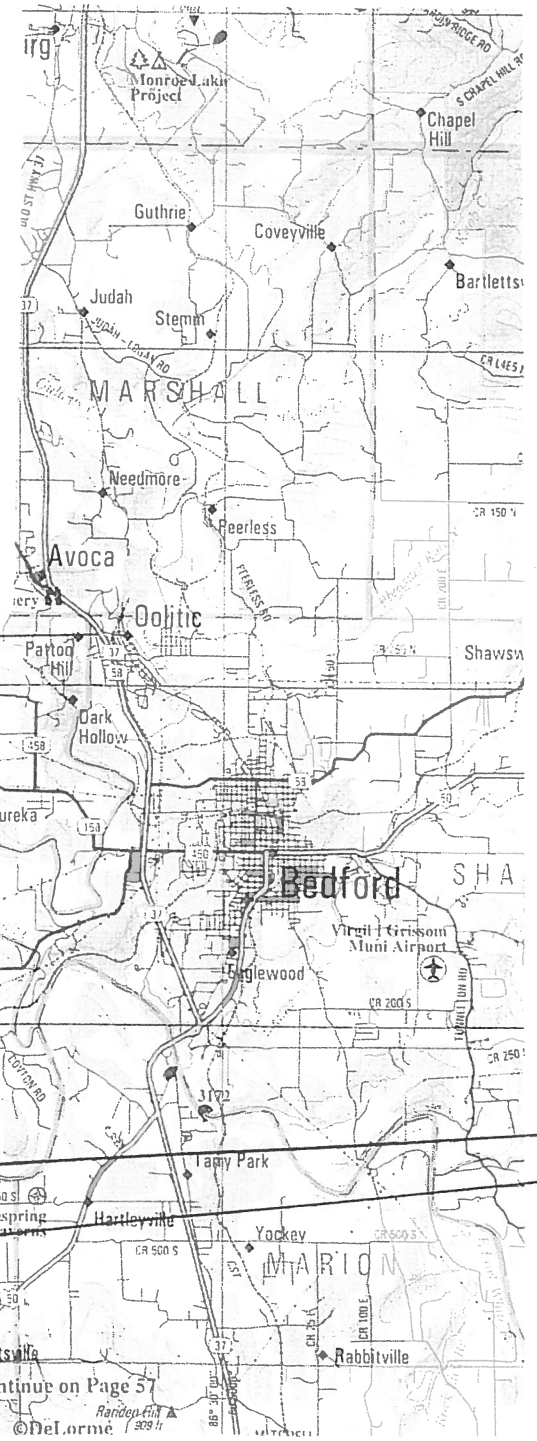
APPENDIX 1

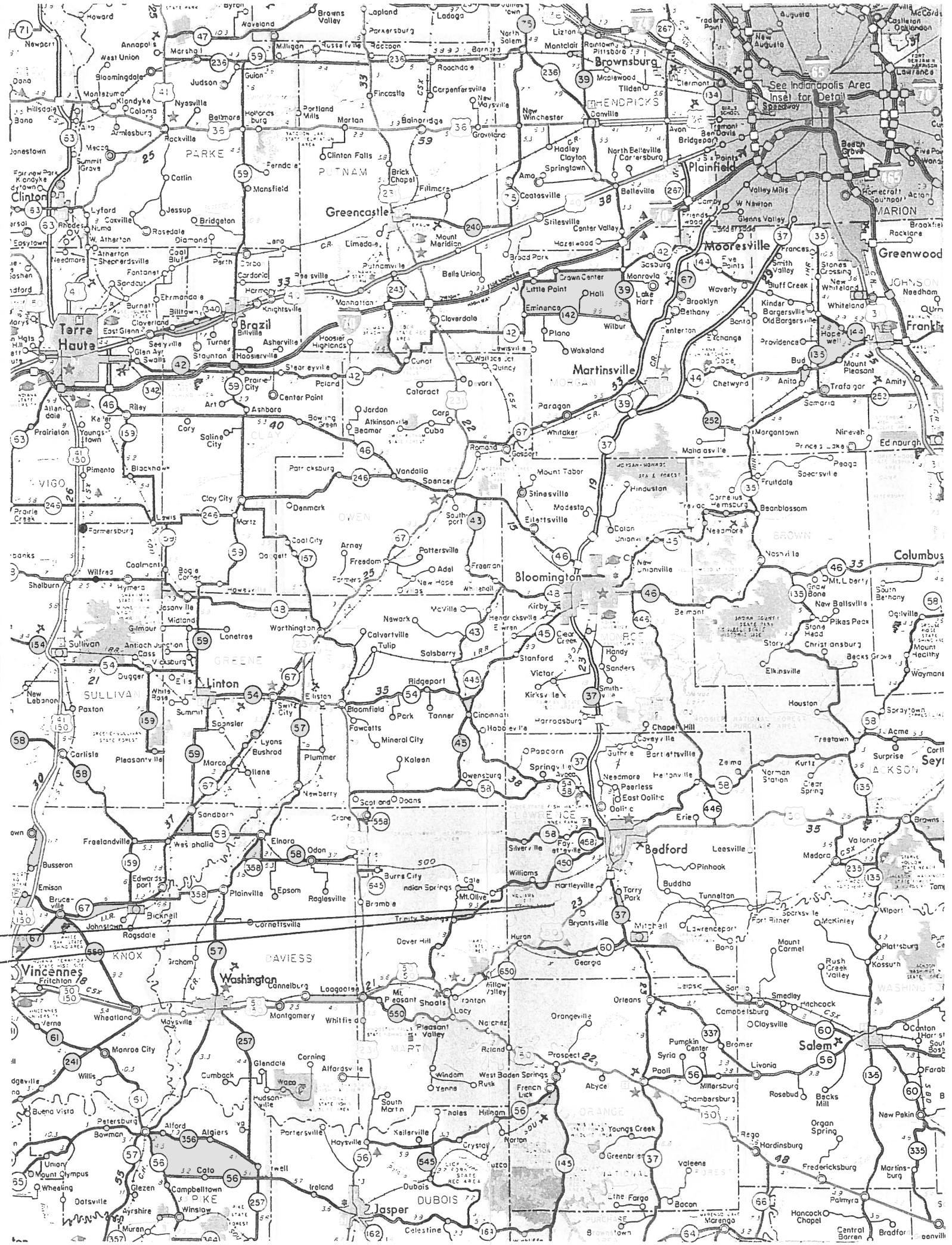
(Item 2)

Map of the Area of Interest

Map of Area of Interest (Item 2)

The North Lawrence Water Corporation wellfield is located in Lawrence County, Indiana, approximately 5 miles southwest of the Town of Bedford, on the floodplain north of East Fork White River, nearly 2.5 miles north of State Road 50 near Bryantsville.





APPENDIX 2

Geologic Cross Sections:

Hydrostratigraphic Units *(Item 4)*
Water Levels *(Item 5)*
Relationship of Surface Water to Hydrostratigraphic Units *(Item 6)*
Pumping Wells w/ Screened Intervals *(Item 7)*

Scales

2000 ft

V.E. = 36x

100 ft

Feet Above
Mean Sea Level

700

600

500

400

228148

228153

228143

East Fork White River

264871

264851

264861

Si. cl.

static water level

CLAY

SAND

165'

120'

60'

67'

243'

68'

Mississippian System Limestone Bedrock

NORTH

SOUTH

North Lawrence Well Field

Well Field Cross Section
North Lawrence Water Co.
P.O. Box 277
Bedford, Indiana

REB CONSULTANTS
6357 Deerwood Ct.
Greenwood, IN 46143
317.865.1917

Scale: As Shown	Item 4

APPENDIX 3

(Item 8)

Well Logs and Records

(Used in the Cross Section Development)

Well Summary

There were 12 matches.

Click on the Reference Number for more information about any specific well. If you wish to purchase a tab-delimited file, please click "Download Tab-Delimited File".

Download Tab-Delimited File

Reference Number	*Driving directions to well*		*Date completed*
228174	4849'E & 2750'N OF SW CORNER OF SECTION 11, 176'W OF 12" PUMPED WELL 12-79-E		Fri, Feb 23, 1979
Owner-Contractor	*Name*	*Address*	*Telephone*
Well Owner	NORTH LAWRENCE WATER CORP.	BEDFORD	
Building Contractor			
Drilling Contractor	LAYNE NORTHERN CO., INC.	MISHAWAKA	
Administrative	*County:* LAWRENCE		*Township:* 4N *Range:* 2W
	Section: SE 1/4 of the SE 1/4 of the NE 1/4 of Section 11		*Topo map:* BEDFORD WEST
	Subdivision name:		*Lot number:*
	Depth: 90.0		

Reference Number	*Driving directions to well*		*Date completed*
228179	FROM WILLIAMS GOING EAST TURN RIGHT UNDER 44, GO APPROXIMATELY 2 MILES, TURN RIGHT TOP OF HILL 1ST HOUSE ON RIGHT		Thu, Sep 09, 1965
Owner-Contractor	*Name*	*Address*	*Telephone*
Well Owner	HERB MITCHELL	RR WILLIAMS	
Building Contractor			
Drilling Contractor	LOUIE O. SMITH	R 1, BEDFORD IN	
Administrative	*County:* LAWRENCE		*Township:* 4N *Range:* 2W
	Section: NW 1/4 of the NE 1/4 of the NW 1/4 of Section 11		*Topo map:* BEDFORD WEST
	Subdivision name:		*Lot number:*
	Depth: 260.0		

Reference Number	*Driving directions to well*		*Date completed*
228184	225' E OF PUMPED WELL; 5250' EAST AND 2750' N OF SW CORNER OF SECTION 11		Thu, Feb 15, 1979
Owner-Contractor	*Name*	*Address*	*Telephone*
Well Owner	NORTH LAWRENCE WATER CORP.	BEDFORD	
Building Contractor			
Drilling Contractor	LAYNE NORTHERN CO., INC.	MISHAWAKA IN	
Administrative	*County:* LAWRENCE		*Township:* 4N *Range:* 2W
	Section: SE 1/4 of the SE 1/4 of the NE 1/4 of Section 11		*Topo map:* BEDFORD WEST
	Subdivision name:		*Lot number:*
	Depth: 94.0		

Reference Number **228189**

Driving directions to well: 0.5 MI. WEST "STUMP HOLE" BRIDGE, BETWEEN WILLIAMS & BEDFORD. 1.5 MI WEST RD 37 ON WHITE RIVER ON ROL MILLER FARM.

Date completed: Fri, Aug 26, 1960

	Name	*Address*	*Telephone*
Owner-Contractor			
Well Owner	HENRY BURKE	CABIN	
Building Contractor			
Drilling Contractor	JOHN REYNOLDS & SON	WEST BADEN SPRS, IN	

Administrative

County: LAWRENCE *Township:* 4N *Range:* 2W

Section: SE 1/4 of the NW 1/4 of the SE 1/4 of Section 11 *Topo map:* BEDFORD WEST

Subdivision name: *Lot number:*

Depth: 107.0

Reference Number **228194**

Driving directions to well: FOUND NORTH OF THE EAST FORK OF WHITE RIVER, SEE ENCLOSED TOPO MAP FOR LOCATION

Date completed: Wed, Apr 23, 1980 ✓

	Name	*Address*	*Telephone*
Owner-Contractor			
Well Owner	NORTH LAWRENCE WATER CORP.		
Building Contractor	REYNOLDS SUPPLY INC.	1421 MELLWOOD AVENUE, LOUISVILLE KY 40206	
Drilling Contractor	REYNOLDS SUPPLY INC.		

Administrative

County: LAWRENCE *Township:* 4N *Range:* 2W

Section: NW 1/4 of the NE 1/4 of the SE 1/4 of Section 11 *Topo map:* BEDFORD WEST

Subdivision name: *Lot number:*

Depth: 90.5

Reference Number **228199**

Driving directions to well: FOUND NORTH OF THE EAST FORK OF WHITE RIVER, SEE ENCLOSED TOPO MAP FOR LOCATION

Date completed: Wed, Apr 23, 1980 ✓

	Name	*Address*	*Telephone*
Owner-Contractor			
Well Owner	NORTH LAWRENCE WATER CORP.		
Building Contractor	REYNOLDS SUPPLY INC.	1421 MELLWOOD AVENUE, LOUISVILLE, KY 40206	
Drilling Contractor	REYNOLDS SUPPLY INC.		

Administrative

County: LAWRENCE *Township:* 4N *Range:* 2W

Section: NE 1/4 of the NE 1/4 of the SE 1/4 of Section 11 *Topo map:* BEDFORD WEST

Subdivision name: *Lot number:*

Depth: 87.5

Reference Number **228204**

Driving directions to well: FOUND NORTH OF EAST FORK OF WHITE RIVER, SEE ENCLOSED TOPO MAP FOR LOCATION

Date completed: Thu, Apr 24, 1980 ✓

	Name	*Address*	*Telephone*
Owner-Contractor			
Well Owner	NORTH LAWRENCE WATER CORP.		
Building Contractor	REYNOLDS SUPPLY INC.	1421 MELLWOOD AVENUE, LOUISVILLE KY 40206	
Drilling Contractor	REYNOLDS SUPPLY INC.		

Administrative

County: LAWRENCE *Township:* 4N *Range:* 2W

Section: SE 1/4 of the SE 1/4 of the NE 1/4 of Section 11 *Topo map:* BEDFORD WEST

Subdivision name: *Lot number:*

Depth: 99.0

Reference Number **264851**

Driving directions to well: 5025'E & 2750'N OF SW CORNER OF SECTION1 11, 17' N OF TW 79E

Date completed: Fri, May 04, 1979

	Name	*Address*	*Telephone*
Owner-Contractor			
Well Owner	NORTH LAWRENCE WATER CORP.	BEDFORD IN	
Building Contractor			
Drilling Contractor	LAYNE NORTHERN CO.		

Administrative

County: LAWRENCE *Township:* 4N *Range:* 2W

Section: SE 1/4 of the SE 1/4 of the NE 1/4 of Section 11 *Topo map:* BEDFORD WEST

Subdivision name: *Lot number:*

Depth: 68.0

Reference Number **264856**

Driving directions to well: 4410' & 2750' N OF SW CORNER OF SECTION 11, 615' WEST OF 12' PUMPED WELL, 70-12-E

Date completed: Thu, Feb 01, 1979

	Name	*Address*	*Telephone*
Owner-Contractor			
Well Owner	NORTH LAWRENCE WATER CORP.	BEDFORD IN	
Building Contractor			
Drilling Contractor	LAYNE NORTHERN COMPANY		

Administrative

County: LAWRENCE *Township:* 4N *Range:* 2W

Section: SW 1/4 of the SE 1/4 of the NE 1/4 of Section 11 *Topo map:* BEDFORD WEST

Subdivision name: *Lot number:*

Depth: 60.0

Reference Number **264861**

Driving directions to well: 5042' E & 2750'N OF SW CORNER OF SECTION 11; 17' E OF 12" PUMPED WELL 12-79-E

Date completed: Thu, Feb 01, 1979

	Name	*Address*	*Telephone*
Owner-Contractor			
Well Owner	NORTH LAWRENCE WATER CORP.	BEDFORD IN	
Building Contractor			
Drilling Contractor	LAYNE NORTHERN COMPANY		

Administrative

County: LAWRENCE *Township:* 4N *Range:* 2W

Section: SE 1/4 of the SE 1/4 of the NE 1/4 of Section 11 *Topo map:* BEDFORD WEST

Subdivision name: *Lot number:*

Depth: 67.0

Reference Number **264866**

Driving directions to well: 5042' E. OF 3450' N OF SW CORNER OF SECTION 11; 17' E & 700' N OF 12" PUMPED WELL 79-12-E

Date completed: Thu, Feb 01, 1979

	Name	*Address*	*Telephone*
Owner-Contractor			
Well Owner	NORTHERN LAWRENCE WATER CO.	BEDFORD, IN	
Building Contractor			
Drilling Contractor	LAYNE NORTHERN CO.		

Administrative

County: LAWRENCE *Township:* 4N *Range:* 2W

Section: NW 1/4 of the SE 1/4 of the NE 1/4 of Section 11 *Topo map:* BEDFORD WEST

Subdivision name: *Lot number:*

Depth: 80.0

Reference Number	*Driving directions to well*	*Date completed*
264871	5042' E & 4150' N OF SW CORNER OF SECTION 11; 1400' N & 17' EAST OF 12 PUMPED WELL 79-12-8	Thu, Feb 01, 1979

Owner-Contractor	*Name*	*Address*	*Telephone*
Well Owner	NORTH LAWRENCE WATER CO.	BEDFORD, IN	
Building Contractor			
Drilling Contractor	LAYNE NORTHERN CO.		

Administrative

County: LAWRENCE *Township:* 4N *Range:* 2W

Section: SE 1/4 of the NE 1/4 of the NE 1/4 of Section 11 *Topo map:* BEDFORD WEST

Subdivision name: *Lot number:*

Depth: 60.0

Download Tab-Delimited File

Record of Water Well

Indiana Department of Natural Resources

Reference Number	*Driving directions to well*	*Date completed*
264851	5025'E & 2750'N OF SW CORNER OF SECTION1 11, 17' N OF TW 79E	Fri. May 04. 1979

	Name	*Address*	*Telephone*
Owner-Contractor			
Well Owner	NORTH LAWRENCE WATER CORP.	BEDFORD IN	
Building Contractor			
Drilling Contractor	LAYNE NORTHERN CO.		
Equipment Operator	C. FREEMAN & L. FORD	License:	

Construction Details

Well	*Use:* PUBLIC SUPPLY	*Drilling method:* ROTARY	*Pump type:*
	Depth: 68.0	*Pump setting depth:*	*Water quality:*
Casing	*Length:* 68.5	*Material:*	*Diameter:* 12.0
Screen	*Length:* 10.0	*Material:*	*Diameter:* 12.0 *Slot size:* .050

Well Capacity Test

Type of test: *Test rate:* 264.0 gpm for 72.0 hrs. *BailTest rate:* gpm for hrs.
Drawdown: 35.5 ft. *Static water level:* 16.0 ft.

Grouting Information

Material: *Depth:* from to
Installation Method: *Number of bags used:*

Well Abandonment

Sealing material: *Depth:* from to
Installation Method: *Number of bags used:*

Administrative

County: LAWRENCE *Township:* 4N *Range:* 2W
Section: SE 1/4 of the SE 1/4 of the NE 1/4 of Section 11 *Topo map:* BEDFORD WEST
Field located by: *on:*
Courthouse location by: *on:*
Location accepted w/o verification by: *on:*
Subdivision name: *Lot number:*
Ft W of EL: 200 *Ft N of SL:* *Ft E of WL:* *Ft S of NL:* 2650
Ground elevation: 479.3 *Depth to bedrock:* *Bedrock elevation:* *Aquifier elevation:* 411.0
UTM Easting: 535403.0 *UTM Northing:* 4293973.0

Well Log

Top	Bottom	Formation
0.0	13.0	BROWN SANDY CLAY
13.0	58.0	CRS. MED. & FINE GRAV W/ M-F S
58.0	68.0	CRS. MED & FINE GRAV W/ CRS TO

Comments MC410; WELL 79-12-E; PUMPING TEST DATA INSIDE THIS PACKET OF MATERIAL

CASING EXTENDS 1 [illegible] LEVEL

JOB NO. NA-1102

DISTRICT Indianapolis

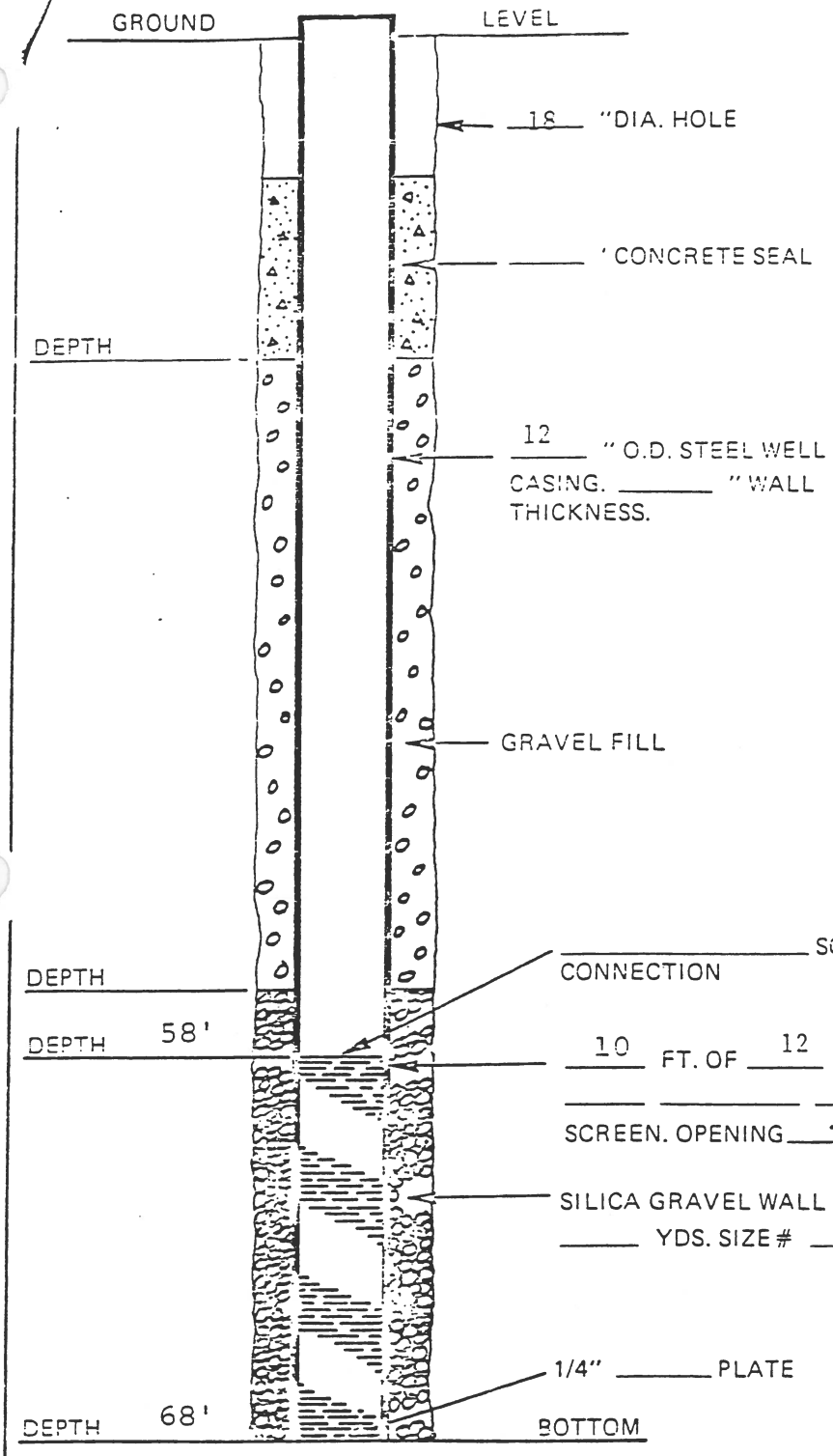
LOCATION 2025'E & 2750'N of SW Corner of Section 11, 17' W of TW 79E

COUNTY Lawrence

TOWNSHIP Spice Valley

SECTION 11 T 4N R 2W

STATE Ind.



CASING TALLY — WELDED THREADED

	FT.	IN.
BOTTOM		
TOP		
TOTAL		

FILL USED FROM BOTTOM UP

SILICA GRAVEL PACK ____ TO ____ FT.

GRAVEL FILL ____ TO ____ FT.

CONCRETE ____ TO ____ FT.

STATIC LEVEL 16'

PUMPED 264 G.P.M. AT 35.5 FEET PUMPING LEVEL AFTER 72 HOURS

TYPE OF RIG Rotary DRILLER C. Freeman DATE COMPLETED 5/4/79

part of record

01-01 264851

NOTE: ALL DEPTHS MEASURED FROM GROUND LEVEL. NOT TO SCALE.

GRAVEL WALL WELL NO. 1 TYPE SC-1

FOR: North Lawrence Water Corp. 79-12-E

LAYNE-NORTHERN

INDIANAPOLIS, IND. • MISHAWAKA, IND. • LANSING, MICH.

DRAWING NUMBER SC-1

LNo-4

Layne NORTHERN COMPANY
A DIVISION OF LAYNE WESTERN CO.
INDIANAPOLIS

Date 5/3 19 79

PRODUCTION TEST OF WELL

Job No. NA 1102

Owner N. Lawrence Water City Bedford State Indiana

Well No. 79-12-E Location also show sketch on back

Measured from Ground Level: Total Depth ___ Inside Dia. ___ Standing Water Level ___

Type Well: Gravel Wall ___ Tubular ___ Rock ___ New ___ Old ___ Cleaned ___ Gravel Wall Dia ___

Screen: Length ___ Dia. ___ Slot Size ___ Type ___ Depth to Top ___

Driven by Electric ( ) Engine ( ) Pump Bowl ___ Stages ___

Length Suction Pipe ___ ' Well top to bottom of Suction ___

Orifice Size ___ by ___ Water discharged ___ feet from well into ___

Well top to bottom of air line ___ ' Gauge reads feet ( ) pounds ( )

DATE	TIME	INCHES ON ORIFICE	GALLONS PER MINUTE	AIR LINE READING	GROUND TO WATER LEVEL	DISCHARGE PRESSURE	REMARKS
5/3/79	11:30						17' 3/4"
5/4/79	5:30a.m.						16' 11¼"
	11:30a.m.						16'10"
	NOTE:	WATER LEVEL MEASURING POINT 2' ABOVE GRADE					

State fully any details on back of this sheet. Water temperature near end of test °F

Tested and Witnessed by

___

Record of Water Well

Indiana Department of Natural Resources

Reference Number	*Driving directions to well*	*Date completed*
264861	5042' E & 2750'N OF SW CORNER OF SECTION 11; 17' E OF 12" PUMPED WELL 12-79-E 79-12-E	Thu, Feb 01, 1979

Owner-Contractor	*Name*	*Address*	*Telephone*
Well Owner	NORTH LAWRENCE WATER CORP.	BEDFORD IN	
Building Contractor			
Drilling Contractor	LAYNE NORTHERN COMPANY		
Equipment Operator	C. FREEMAN & L. FORD	License:	

Construction Details

Well	*Use:*	*Drilling method:* ROTARY	*Pump type:*
	Depth: 67.0	*Pump setting depth:*	*Water quality:*
Casing	*Length:* 49.0	*Material:*	*Diameter:* 2.0
Screen	*Length:* 20.0	*Material:*	*Diameter:* 2.0 *Slot size:*

Well Capacity Test

Type of test: *Test rate:* gpm for hrs. *BailTest rate:* gpm for hrs.
Drawdown: ft. *Static water level:* 13.7 ft.

Grouting Information

Material: *Depth:* from to
Installation Method: *Number of bags used:*

Well Abandonment

Sealing material: *Depth:* from to
Installation Method: *Number of bags used:*

Administrative

County: LAWRENCE *Township:* 4N *Range:* 2W
Section: SE 1/4 of the SE 1/4 of the NE 1/4 of Section 11 *Topo map:* BEDFORD WEST
Field located by: *on:*
Courthouse location by: *on:*
Location accepted w/o verification by: *on:*
Subdivision name: *Lot number:*
Ft W of EL: 183 *Ft N of SL:* *Ft E of WL:* *Ft S of NL:* 2650
Ground elevation: 480.0 *Depth to bedrock:* *Bedrock elevation:* *Aquifier elevation:*
UTM Easting: 535403.0 *UTM Northing:* 4294187.0

Well Log

Top	Bottom	Formation
0.0	13.0	BROWN SANDY CLAY
13.0	58.0	CRS. MED & FINE GRA W. CRS TO
58.0	67.0	CRS. MED& FINE GRAV W/ STRIPS
67.0	0.0	WOOD BLACK CLAY W/ GREEN & BRO

Comments TEST 79-E

Record of Water Well

Indiana Department of Natural Resources

Reference Number	*Driving directions to well*	*Date completed*
264871	5042' E & 4150' N OF SW CORNER OF SECTION 11: 1400' N & 17' EAST OF 12" PUMPED WELL 79-12-8	Thu, Feb 01, 1979

Owner-Contractor	*Name*	*Address*	*Telephone*
Well Owner	NORTH LAWRENCE WATER CO.	BEDFORD, IN	
Building Contractor			
Drilling Contractor	LAYNE NORTHERN CO.		
Equipment Operator	C. FREEMAN	License:	

Construction Details

Well	*Use:* TEST	*Drilling method:* ROTARY	*Pump type:*
	Depth: 60.0	*Pump setting depth:*	*Water quality:*
Casing	*Length:*	*Material:*	*Diameter:*
Screen	*Length:*	*Material:*	*Diameter: Slot size:*

Well Capacity Test

Type of test: *Test rate:* gpm for hrs. *BailTest rate:* gpm for hrs.
Drawdown: ft. *Static water level:* ft.

Grouting Information

Material: *Depth:* from to
Installation Method: *Number of bags used:*

Well Abandonment

Sealing material: *Depth:* from to
Installation Method: *Number of bags used:*

Administrative

County: LAWRENCE *Township:* 4N *Range:* 2W
Section: SE 1/4 of the NE 1/4 of the NE 1/4 of Section 11 *Topo map:* BEDFORD WEST
Field located by: *on:*
Courthouse location by: *on:*
Location accepted w/o verification by: *on:*
Subdivision name: *Lot number:*
Ft W of EL: 225 *Ft N of SL:* *Ft E of WL:* *Ft S of NL:* 1300
Ground elevation: 496.0 *Depth to bedrock:* 43.0 *Bedrock elevation:* 453.0 *Aquifier elevation:*
UTM Easting: 535385.0 *UTM Northing:* 4294400.0

Well Log

Top	Bottom	Formation
0.0	1.0	LIGHT BROWN CLAY
1.0	4.0	LIGHT BROWN SANDY CLAY
4.0	19.0	BLANK
19.0	20.0	BLACK CLAY W/ SAND
20.0	29.0	LIGHT GRAY CLAY
29.0	30.0	DARK GREEN CLAY
30.0	43.0	LIGHT GRAY CLAY
43.0	52.0	BROKEN LIMESTONE
52.0	54.0	BLUE SHALE
54.0	58.0	RED SHALE
58.0	60.0	HARD WHITE LIMESTONE

Comments MC 453; TEST 79-B; MC

Record of Water Well

Indiana Department of Natural Resources

Reference Number	*Driving directions to well*	*Date completed*
264866	5042' E. OF 3450' N OF SW CORNER OF SECTION 11; 17' E & 700' N OF 12" PUMPED WELL 79-12-E	Thu. Feb 01. 1979

Owner-Contractor	*Name*	*Address*	*Telephone*
Well Owner	NORTHERN LAWRENCE WATER CO.	BEDFORD, IN	
Building Contractor			
Drilling Contractor	LAYNE NORTHERN CO.		
Equipment Operator	C. FREEMAN	License:	

Construction Details

Well	*Use:* TEST	*Drilling method:* ROTARY	*Pump type:*
	Depth: 80.0	*Pump setting depth:*	*Water quality:*
Casing	*Length:*	*Material:*	*Diameter:*
Screen	*Length:*	*Material:*	*Diameter: Slot size:*

Well Capacity Test

Type of test: *Test rate:* gpm for hrs. *BailTest rate:* gpm for hrs.
Drawdown: ft. *Static water level:* ft.

Grouting Information

Material: *Depth:* from to
Installation Method: *Number of bags used:*

Well Abandonment

Sealing material: *Depth:* from to
Installation Method: *Number of bags used:*

Administrative

County: LAWRENCE *Township:* 4N *Range:* 2W
Section: NW 1/4 of the SE 1/4 of the NE 1/4 of Section 11 *Topo map:* BEDFORD WEST
Field located by: *on:*
Courthouse location by: *on:*
Location accepted w/o verification by: *on:*
Subdivision name: *Lot number:*
Ft W of EL: 225 *Ft N of SL:* *Ft E of WL:* *Ft S of NL:* 200
Ground elevation: 492.0 *Depth to bedrock:* 67.0 *Bedrock elevation:* 425.0 *Aquifier elevation:*
UTM Easting: 535391.0 *UTM Northing:* 4294187.0

Well Log

Top	Bottom	Formation
0.0	26.0	LIGHT BROWN SANDY CLAY
26.0	52.0	RED CLAY & MEDIUM GRAVEL
52.0	67.0	HARD GRAY CLAY
67.0	68.0	LIMESTONE
68.0	71.0	DARK BROWN SHALE
71.0	80.0	HARD LIMESTONE

Comments MC 425; TEST 79-C; MC

Record of Water Well

Indiana Department of Natural Resources

Reference Number	*Driving directions to well*	*Date completed*
228184	225' E OF PUMPED WELL; 5250' EAST AND 2750' N OF SW CORNER OF SECTION 11	Thu, Feb 15, 1979

Owner-Contractor	*Name*	*Address*	*Telephone*
Well Owner	NORTH LAWRENCE WATER CORP.	BEDFORD	
Building Contractor			
Drilling Contractor	LAYNE NORTHERN CO., INC.	MISHAWAKA IN	
Equipment Operator	C. FREEMAN	License:	

Construction Details

Well	***Use:***	***Drilling method:*** ROTARY	***Pump type:***
	Depth: 94.0	***Pump setting depth:***	***Water quality:***
Casing	***Length:*** 50.0	***Material:***	***Diameter:*** 2.0
Screen	***Length:***	***Material:***	***Diameter: Slot size:***

Well Capacity Test

Type of test: ***Test rate:*** gpm for hrs. ***BailTest rate:*** gpm for hrs.

Drawdown: ft. ***Static water level:*** 12.0 ft.

Grouting Information

Material: ***Depth:*** from to

Installation Method: ***Number of bags used:***

Well Abandonment

Sealing material: ***Depth:*** from to

Installation Method: ***Number of bags used:***

Administrative

County: LAWRENCE ***Township:*** 4N ***Range:*** 2W

Section: SE 1/4 of the SE 1/4 of the NE 1/4 of Section 11 ***Topo map:*** BEDFORD WEST

Field located by: ***on:***

Courthouse location by: ***on:***

Location accepted w/o verification by: ***on:***

Subdivision name: ***Lot number:***

Ft W of EL: 0 ***Ft N of SL:*** ***Ft E of WL:*** ***Ft S of NL:*** 2650

Ground elevation: 476.2 ***Depth to bedrock:*** 94.0 ***Bedrock elevation:*** 382.0 ***Aquifier elevation:***

UTM Easting: 535434.0 ***UTM Northing:*** 4293973.0

Well Log

Top	Bottom	Formation
0.0	1.0	LIGHT BROWN CLAY
1.0	4.0	LIGHT BROWN SANDY CLAY
4.0	9.0	CRS. MED. FINE SAND
9.0	68.0	MED. & FINE SAND
68.0	94.0	MED. & FINE SAND W/ GREEN CLAY
94.0	0.0	LIMESTONE

Comments MC382; TEST 79-A; DETAILED WATER LEVEL DATA AT OBS. WELL FOR PUMP TEST CONDUCTED ON WELL #1

Record of Water Well

Indiana Department of Natural Resources

Reference Number	*Driving directions to well*	*Date completed*
228174	4849'E & 2750'N OF SW CORNER OF SECTION 11, 176'W OF 12" PUMPED WELL 12-79-E	Fri. Feb 23, 1979

Owner-Contractor	*Name*	*Address*	*Telephone*
Well Owner	NORTH LAWRENCE WATER CORP.	BEDFORD	
Building Contractor			
Drilling Contractor	LAYNE NORTHERN CO., INC.	MISHAWAKA	
Equipment Operator	C. FREEMAN	License:	

Construction Details

Well	*Use:*	*Drilling method:* ROTARY	*Pump type:*
	Depth: 90.0	*Pump setting depth:*	*Water quality:*
Casing	*Length:* 46.0	*Material:*	*Diameter:* 2.0
Screen	*Length:*	*Material:*	*Diameter: Slot size:*

Well Capacity Test

Type of test: *Test rate:* gpm for hrs. *BailTest rate:* gpm for hrs.
Drawdown: ft. *Static water level:* 16.25 ft.

Grouting Information

Material: *Depth:* from to
Installation Method: *Number of bags used:*

Well Abandonment

Sealing material: *Depth:* from to
Installation Method: *Number of bags used:*

Administrative

County: LAWRENCE *Township:* 4N *Range:* 2W
Section: SE 1/4 of the SE 1/4 of the NE 1/4 of Section 11 *Topo map:* BEDFORD WEST
Field located by: *on:*
Courthouse location by: *on:*
Location accepted w/o verification by: *on:*
Subdivision name: *Lot number:*
Ft W of EL: 400 *Ft N of SL:* *Ft E of WL:* *Ft S of NL:* 2700
Ground elevation: 481.2 *Depth to bedrock:* *Bedrock elevation:* *Aquifier elevation:*
UTM Easting: 535318.0 *UTM Northing:* 4293976.0

Well Log

Top	Bottom	Formation
0.0	13.0	BROWN SANDY CLAY
13.0	31.0	CRS. MED. & FINE SAND
31.0	42.0	CRS. MED. FINE GRAVL. W/ CRS.
42.0	64.0	CRS. MED FINE SAND
64.0	76.0	CRS. MED FINE SAND W/ FINE GRA
76.0	80.0	BLUE CLAY
80.0	84.0	GREEN CLAY
84.0	90.0	HARD LIMESTONE

Comments TEST 79-D; BBS WELL DATA INCLUDED IN THIS PACKET; OTHER TEST WELLS DRILLED IN IMMEDIATE VICINITY

Record of Water Well

Indiana Department of Natural Resources

Reference Number	*Driving directions to well*	*Date completed*
228204	FOUND NORTH OF EAST FORK OF WHITE RIVER, SEE ENCLOSED TOPO MAP FOR LOCATION	Thu. Apr 24. 1980

	Name	*Address*	*Telephone*
Owner-Contractor			
Well Owner	NORTH LAWRENCE WATER CORP.		
Building Contractor	REYNOLDS SUPPLY INC.	1421 MELLWOOD AVENUE, LOUISVILLE KY 40206	
Drilling Contractor	REYNOLDS SUPPLY INC.		
Equipment Operator	BARRY SINGLETON	License:	

Construction Details

Well	*Use:* PUBLIC SUPPLY	*Drilling method:* ROTARY	*Pump type:*
	Depth: 99.0	*Pump setting depth:*	*Water quality:*
Casing	*Length:* 94.0	*Material:*	*Diameter:* 2.0
Screen	*Length:* 5.0	*Material:*	*Diameter:* 2.0 *Slot size:* 10

Well Capacity Test

Type of test: *Test rate:* gpm for hrs. *BailTest rate:* gpm for hrs.
Drawdown: ft. *Static water level:* 19.0 ft.

Grouting Information

Material: *Depth:* from to
Installation Method: *Number of bags used:*

Well Abandonment

Sealing material: *Depth:* from to
Installation Method: *Number of bags used:*

Administrative

County: LAWRENCE *Township:* 4N *Range:* 2W
Section: SE 1/4 of the SE 1/4 of the NE 1/4 of Section 11 *Topo map:* BEDFORD WEST
Field located by: *on:*
Courthouse location by: *on:*
Location accepted w/o verification by: *on:*
Subdivision name: *Lot number:*
Ft W of EL: 280 *Ft N of SL:* *Ft E of WL:* *Ft S of NL:* 1900
Ground elevation: *Depth to bedrock:* *Bedrock elevation:* *Aquifier elevation:*
UTM Easting: 535360.0 *UTM Northing:* 4294187.0

Well Log

Top	Bottom	Formation
0.0	3.0	TOPSOIL
3.0	8.0	SILTY SANDY CLAY
8.0	13.0	FINE-MED. SAND, SILTY & CLAYEY
13.0	23.0	MED. CRS. SAND V. SILTY
23.0	38.0	CRS. SAND WITH GRAVEL
38.0	53.0	FINE-MED. SAND
53.0	58.0	MED. SAND WITH SOME FINE SAND
58.0	73.0	CRS. SAND SOME GRAVEL
73.0	83.0	MED. TO CRS SAND
83.0	88.0	LAMINATED CLAY
88.0	99.0	BLUE GRAY HARDPAN CLAY

Comments AUGER TEST WELL #1; DETAILED FORMATION LOT ATTACHED

Record of Water Well

Indiana Department of Natural Resources

Reference Number	*Driving directions to well*	*Date completed*
228199	FOUND NORTH OF THE EAST FORK OF WHITE RIVER. SEE ENCLOSED TOPO MAP FOR LOCATION	Wed, Apr 23, 1980

Owner-Contractor	*Name*	*Address*	*Telephone*
Well Owner	NORTH LAWRENCE WATER CORP.		
Building Contractor	REYNOLDS SUPPLY INC.	1421 MELLWOOD AVENUE. LOUISVILLE. KY 40206	
Drilling Contractor	REYNOLDS SUPPLY INC.		
Equipment Operator	BARRY SINGLETON	License:	

Construction Details

Well	*Use:* PUBLIC SUPPLY	*Drilling method:* ROTARY	*Pump type:*
	Depth: 87.5	*Pump setting depth:*	*Water quality:*
Casing	*Length:* 82.5	*Material:*	*Diameter:* 2.0
Screen	*Length:* 5.0	*Material:*	*Diameter:* 2.0 *Slot size:* 10

Well Capacity Test

Type of test: *Test rate:* gpm for hrs. *BailTest rate:* gpm for hrs.

Drawdown: ft. *Static water level:* 6.0 ft.

Grouting Information

Material: *Depth:* from to

Installation Method: *Number of bags used:*

Well Abandonment

Sealing material: *Depth:* from to

Installation Method: *Number of bags used:*

Administrative

County: LAWRENCE *Township:* 4N *Range:* 2W

Section: NE 1/4 of the NE 1/4 of the SE 1/4 of Section 11 *Topo map:* BEDFORD WEST

Field located by: *on:*

Courthouse location by: *on:*

Location accepted w/o verification by: *on:*

Subdivision name: *Lot number:*

Ft W of EL: 325 *Ft N of SL:* 2470 *Ft E of WL:* *Ft S of NL:*

Ground elevation: *Depth to bedrock:* *Bedrock elevation:* *Aquifier elevation:*

UTM Easting: 535349.0 *UTM Northing:* 4293882.0

Well Log

Top	Bottom	Formation
0.0	3.0	TOPSOIL
3.0	8.0	MED. BROWN SILTY CLAY
8.0	28.0	SAND & GRAVEL
28.0	42.0	MED. CRS. SAND
42.0	48.0	MED. SAND
48.0	63.0	MED. CRS. FINE SAND WITH GRAVE
63.0	68.0	MED. SAND
68.0	87.5	MED. CRS. SAND W/ GRAVEL

Comments AUGER TEST WELL #2

Record of Water Well

Indiana Department of Natural Resources

Reference Number	*Driving directions to well*	*Date completed*
228194	FOUND NORTH OF THE EAST FORK OF WHITE RIVER, SEE ENCLOSED TOPO MAP FOR LOCATION	Wed, Apr 23, 1980

Owner-Contractor	*Name*	*Address*	*Telephone*
Well Owner	NORTH LAWRENCE WATER CORP.		
Building Contractor	REYNOLDS SUPPLY INC.	1421 MELLWOOD AVENUE. LOUISVILLE KY 40206	
Drilling Contractor	REYNOLDS SUPPLY INC.		
Equipment Operator	BARRY SINGLETON	License:	

Construction Details

Well	*Use:* PUBLIC SUPPLY	*Drilling method:* ROTARY	*Pump type:*
	Depth: 90.5	*Pump setting depth:*	*Water quality:*
Casing	*Length:* 85.5	*Material:*	*Diameter:* 2.0
Screen	*Length:* 5.0	*Material:*	*Diameter:* 2.0 *Slot size:* 10

Well Capacity Test

Type of test: *Test rate:* gpm for hrs. *BailTest rate:* gpm for hrs.

Drawdown: ft. *Static water level:* 8.0 ft.

Grouting Information

Material: *Depth:* from to

Installation Method: *Number of bags used:*

Well Abandonment

Sealing material: *Depth:* from to

Installation Method: *Number of bags used:*

Administrative

County: LAWRENCE *Township:* 4N *Range:* 2W

Section: NW 1/4 of the NE 1/4 of the SE 1/4 of Section 11 *Topo map:* BEDFORD WEST

Field located by: *on:*

Courthouse location by: *on:*

Location accepted w/o verification by: *on:*

Subdivision name: *Lot number:*

Ft W of EL: 1010 *Ft N of SL:* 2470 *Ft E of WL:* *Ft S of NL:*

Ground elevation: *Depth to bedrock:* *Bedrock elevation:* *Aquifier elevation:*

UTM Easting: 535123.0 *UTM Northing:* 4293875.0

Well Log

Top	Bottom	Formation
0.0	3.0	TOPSOIL
3.0	13.0	BROWN SILTY FINE SANDY CLAY
13.0	18.0	SAND
18.0	22.0	BOULDERS
22.0	23.0	SAND
23.0	28.0	SAND & GRAVEL
28.0	38.0	MED. V. CRS SAND W/ SOME GRAVE
38.0	48.0	MED. SAND WITH SOME FINE SAND
48.0	63.0	FINE & MED. SAND
63.0	68.0	MED. CRS SAND
68.0	73.0	MED. VERY CRS. SAND
73.0	83.0	MED. SAND WITH FINE & COARSE
83.0	90.5	MED. SAND WITH FINE GRAVEL

APPENDIX 4

Maps of Proposed Wellhead Protection Area:

Location of CPWSS Wells *(Item 9)*
Location of Registered High Capacity Wells *(Item 10)*
Surface Water Features *(Item 11)*
Thickness and Extent of Hydrostratigraphic Units *(Item 12)*
Regional Ground Water Levels *(Item 13)*
Bedrock Topography *(Item 14)*

ANNUAL WATER USE REPORT FORM FOR A
SIGNIFICANT WATER WITHDRAWAL FACILITY
FORM # : 21915R

JAN 1998
RECEIVED
DNR
DIV OF WATER

SEND TO : INDIANA DEPARTMENT OF NATURAL RESOURCES
DIVISION OF WATER
402 WEST WASHINGTON ST., ROOM W264
INDIANAPOLIS, INDIANA 46204
TELEPHONE (317) 232-1116

Please complete items (1) through (7)
Facility Registration Number: 47-00635-PS

Water Withdrawal Report for Year Ending December 31, 1997

----------OWNER OF WATER WITHDRAWAL FACILITY----------

NORTH LAWRENCE WATER CORP
Phone no.: 812-279-2774

Contact: HAWKINS, PHILIP
NORTH LAWRENCE WATER CORP
P O BOX 277

P O BOX 277

BEDFORD, IN 47421

BEDFORD, IN 47421
Phone no.: 812-279-2774

----------WATER WITHDRAWAL RECORD----------

(1) Units Used in Reporting Amounts Withdrawn (Check One): Thousand Gallons ✓ Million Gallons ~~✓~~

(2) Monthly Report for Ground Water Sources

WELL #	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1													
2													
3													0
	13,557	11,768	12,875	14,610	20,164	19,092	20,935	18,987	19,496	18,534	17,181	16,590	0
TOTAL	Wells operate on alternate with equal amounts being drawn from each well.												203,789

(3) Monthly Report for Surface Water Sources

INTAKE#	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
TOTAL													

----------METHOD OF MEASUREMENT----------

(4) Are withdrawal amounts based on flow meter readings? Check One ==> Yes XX No ____

If 'No', please check and complete one of the lines:

_____Hours operated: Hour meter ____ Manual record ____

_____Acre inches: # of acres ____, # inches ____

_____NPDES data: Consumptive use _____ %

_____Other _____

----------TOTAL YEARLY OPERATION TIME----------

(5) Complete ONLY one:

No. of Hours_____ -OR- No. of Days 365

----------STATEMENT OF AFFIRMATION----------

(6) Is your registration information still correct? Check one ==> Yes XX No ___
If 'No', please correct where appropriate.

(7) I hereby affirm under the penalties of perjury, that the information submitted herewith is to the best of my knowledge and belief, true, accurate, and complete.

Owner/Agent | Printed Name Philip Hawkins

Signature Philip Hawkins Date 1/7/98

JAN 1998

COMMENT: COMBINED TOTALS

BFD 1-12-94

ANNUAL WATER USE REPORT FORM FOR A SIGNIFICANT WATER WITHDRAWAL FACILITY
FORM # : [illegible]

SEND TO : INDIANA DEPARTMENT OF NATURAL RESOURCES
DIVISION OF WATER
402 WEST WASHINGTON ST., ROOM [illegible]
INDIANAPOLIS, INDIANA 46204
TELEPHONE (317) 232 [illegible]

Please complete items (1) through (7)
OWNER OF WATER WITHDRAWAL FACILITY

NORTH LAWRENCE WATER CORP   Phone no.: 812-2[illegible]-27[illegible]
P O BOX [illegible]
BEDFORD, I 47421

Contact: HAWKINS, PHILIP   Phone no.: 812-279-2774
NORTH LAWRENCE WATER CORP
P O BOX [illegible]
BEDFORD I 47421

JAN 1994
RECEIVED
DNR
DIV. OF WATER

[illegible]

WATER WITHDRAWAL [illegible]

(1) Units Used In Reporting the Amounts Withdrawn (Check One) ==> Gallons ____ Thousand Gallons ✓ Million Gallons [struck out]

(2) Monthly Report for Ground Water Sources

WELL #	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1													
2													
3	THE THREE WELLS ARE IN CLOSE PROXIMITY THEY PUMP ALTERNATELY AND EACH WELL PRODUCES 1/3 TOTAL												
TOTAL	15561	14185	16181	14033	16236	14051	16275	15405	14686	12745	13448	15413	178219

(3) Monthly Report for Surface Water Sources

INTAKE#	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
TOTAL													

METHOD OF MEASUREMENT

(4) Are withdrawal amounts based on flow meter readings?
Check One ==> Yes X No ___
If "No" is checked, please indicate how the withdrawal amounts were determined (Check and complete one of the lines)
_____ Based on hours operated (hour meter ____ manual record ____)
_____ Based on acre inches (# of acres ____, # inches ____)
_____ Based on Kilowatt hours (Pump power ______________ Watts)
_____ Based on NPDES data (Consumptive use _____ %)
_____ Other ____________________

TOTAL OPERATION TIME

(5) Total number of days operated during the year : 365
Average number of hours operated each day : 12

STATEMENT OF AFFIRMATION

(6) Is your registration information still correct?
Check one ==> Yes X No ___
If "No" is checked, please indicate the corrections where appropriate.

(7) I hereby affirm under the penalties of perjury, that the information submitted herewith is to the best of my knowledge and belief, true, accurate, and complete.

PHILIP HAWKINS, ~~SUPERINTENDENT~~
(Owner or representative name)

Philip Hawkins   1-7-94
(Owner or representative signature)   (Date signed)

Comments Combined Totals

SAC
1120195

JAN 1995
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ANNUAL WATER USE REPORT FORM FOR A SIGNIFICANT WATER WITHDRAWAL FACILIT
FORM # : 21915R

Please complete items (1) through (7)
OWNER OF WATER WITHDRAWAL FACILITY

NORTH LAWRENCE WATER CORP Phone no.: 812-279-2774

P O BOX 277

BEDFORD, IN 47421

SEND TO : INDIANA DEPARTMENT OF NATURAL RESOURCES
DIVISION OF WATER
402 WEST WASHINGTON ST., ROOM W264
INDIANAPOLIS, INDIANA 46204
TELEPHONE (317) 232 1116

Contact: HAWKINS, PHILIP Phone no.: 812-279-2774
NORTH LAWRENCE WATER CORP
P O BOX 277

BEDFORD, IN 47421

Facility Registration Number: 47-00635-PS

Water Withdrawal Report for Year Ending December 31, 1994

WATER WITHDRAWAL RECORD

(1) Units Used in Reporting the Amounts Withdrawn (Check One) ==> Gallons ____ Thousand Gallons X BFD 2/15/95 Million Gallons ~~X~~

(2) Monthly Report for Ground Water Sources

WELL #	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1	0												0
2	0												0
3	The three wells are in close proximity. They pump alternately and each well produces approximately 1/3 total.												
TOTAL	14,843	12,481	13,520	11,195	14,200	14,888	14,871	15,606	14,334	14,252	14,622	14,401	169,213

(3) Monthly Report for Surface Water Sources

INTAKE#	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
TOTAL													

METHOD OF MEASUREMENT

(4) Are withdrawal amounts based on flow meter readings?
Check One ==> Yes X No ____
If 'No' is checked, please indicate how the withdrawal amounts were determined (Check and complete one of the lines)

_____ Based on hours operated (Hour meter ____ Manual record ____)
_____ Based on acre inches (# of acres ____, # inches ____)
_____ Based on Kilowatt hours (Pump power _____ Watts)
_____ Based on NPDES data (Consumptive use _____ %)
_____ Other (_____)

TOTAL OPERATION TIME

(5) Total number of days operated during the year : 365
Average number of hours operated each day : 12

Comment: Combined Totals

STATEMENT OF AFFIRMATION

(6) Is your registration information still correct?
Check one ==> Yes X No ____
If 'No' is checked, please indicate the corrections where appropriate.

(7) I hereby affirm under the penalties of perjury, that the information submitted herewith is to the best of my knowledge and belief, true, accurate, and complete.

Philip Hawkins, ~~Superintendent~~
(Print owner or representative name)

Philip Hawkins
(Owner or representative signature)

1/17/95
(date signed)

ANNUAL WATER USE REPORT FORM FOR A
SIGNIFICANT WATER WITHDRAWAL FACILITY
FORM # : 21915R

SEND TO : INDIANA DEPARTMENT OF NATURAL RESOURCES
DIVISION OF WATER
402 WEST WASHINGTON ST., ROOM W264
INDIANAPOLIS, INDIANA 46204
TELEPHONE (317) 232 1116

Please complete items (1) through (7)
OWNER OF WATER WITHDRAWAL FACILITY

NORTH LAWRENCE WATER CORP Phone no.: 812-279-2774

P O BOX 277

BEDFORD, IN 47421

JAN 1996
RECEIVED
DNR
DIV OF WATER

Contact: HAWKINS, PHILIP Phone no.: 812-279-2774
NORTH LAWRENCE WATER CORP
P O BOX 277

BEDFORD, IN 47421

Facility Registration Number: 47-00633-PS

Water Withdrawal Report for Year Ending December 31, 1995

WATER WITHDRAWAL RECORD

(1) Units Used in Reporting the Amounts Withdrawn (Check One) ==> Gallons ____ Thousand Gallons _V__ Million Gallons XXX

(2) Monthly Report for Ground Water Sources

WELL #	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1													
2													
3													
TOTAL	14,832	13,152	13,839	13,238	14,606	12,130	13,728	15,820	14,158	13,643	14,534	17,754	171,434

(3) Monthly Report for Surface Water Sources * WELLS ALTERNATE WITH EQUAL AMOUNTS DRAWN FROM EACH WELL.

INTAKE#	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
TOTAL													

METHOD OF MEASUREMENT

(4) Are withdrawal amounts based on flow meter readings?
Check One ==> Yes XXX No ____
If 'No' is checked, please indicate how the withdrawal amounts were determined (Check and complete one of the lines)

_____ Based on hours operated (Hour meter ____ Manual record ____)
_____ Based on acre inches (# of acres ____, # inches ____)
_____ Based on Kilowatt hours (Pump power _____ Watts)
_____ Based on NPDES data (Consumptive use _____ %)
_____ Other (_____)

TOTAL OPERATION TIME

(5) Total number of days operated during the year : 365
Average number of hours operated each day : 12

STATEMENT OF AFFIRMATION

(6) Is your registration information still correct?
Check one ==> Yes XXX No ___
If 'No' is checked, please indicate the corrections where appropriate.

(7) I hereby affirm under the penalties of perjury, that the information submitted herewith is to the best of my knowledge and belief, true, accurate, and complete.

PHILIP HAWKINS
(Print owner or representative name)

Philip Hawkins
(Owner or representative signature) 1/10/96 (date signed)

RHS 1/15/97

ANNUAL WATER USE REPORT FORM FOR A
SIGNIFICANT WATER WITHDRAWAL FACILITY
FORM # : 21915R

Please complete items (1) through (7)
OWNER OF WATER WITHDRAWAL FACILITY

NORTH LAWRENCE WATER CORP Phone no.: 812-279-2774

P O BOX 277

BEDFORD, IN 47421

SEND TO : INDIANA DEPARTMENT OF NATURAL RESOURCES
DIVISION OF WATER
402 WEST WASHINGTON ST., ROOM W264
INDIANAPOLIS, INDIANA 46204
TELEPHONE (317) 232 1116

Contact: HAWKINS, PHILIP
NORTH LAWRENCE WATER CORP
P O BOX 277

Phone no.: 812-279-2774

BEDFORD, IN 47421

Facility Registration Number: 47-11828-F3 Water Withdrawal Report For Year Ending December 31, 1996

WATER WITHDRAWAL RECORD

(1) Units Used in Reporting the Amounts Withdrawn (Check One) ==> Gallons ____ Thousand Gallons ____ Million Gallons XXXX

(2) Monthly Report For Ground Water Sources

WELL #	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1													0
2													0
3													
TOTAL	18,279	16,226	18,464	19,666	18,882	18,53'	17,82#	18,238	14,450	12,352	12,033	12,708	195,653,000

(3) Monthly Report For Surface Water Sources

Wells are operated on an alternating basis with one third of monthly total being drawn from each well.

INTAKE#	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
TOTAL													

METHOD OF MEASUREMENT

(4) Are withdrawal amounts based on flow meter readings?
Check One ==> Yes XXXX No ____

If 'No' is checked, please indicate how the withdrawal amounts were determined (Check and complete one of the lines)

_____ Based on hours operated (Hour meter ____ Manual record ____)
_____ Based on acre inches (# of acres ____, # inches ____)
_____ Based on Kilowatt hours (Pump power _____ Watts)
_____ Based on NPDES data (Consumptive use _____ %)
_____ Other (_____)

TOTAL OPERATION TIME

(5) Total number of days operated during the year : 365
Average number of hours operated each day : 14

COMMENT: COMBINED TOTALS

STATEMENT OF AFFIRMATION

(6) Is your registration information still correct?
Check one ==> Yes XXXX No ___
If 'No' is checked, please indicate the corrections where appropriate.

(7) I hereby affirm under the penalties of perjury, that the information submitted herewith is to the best of my knowledge and belief, true, accurate, and complete.

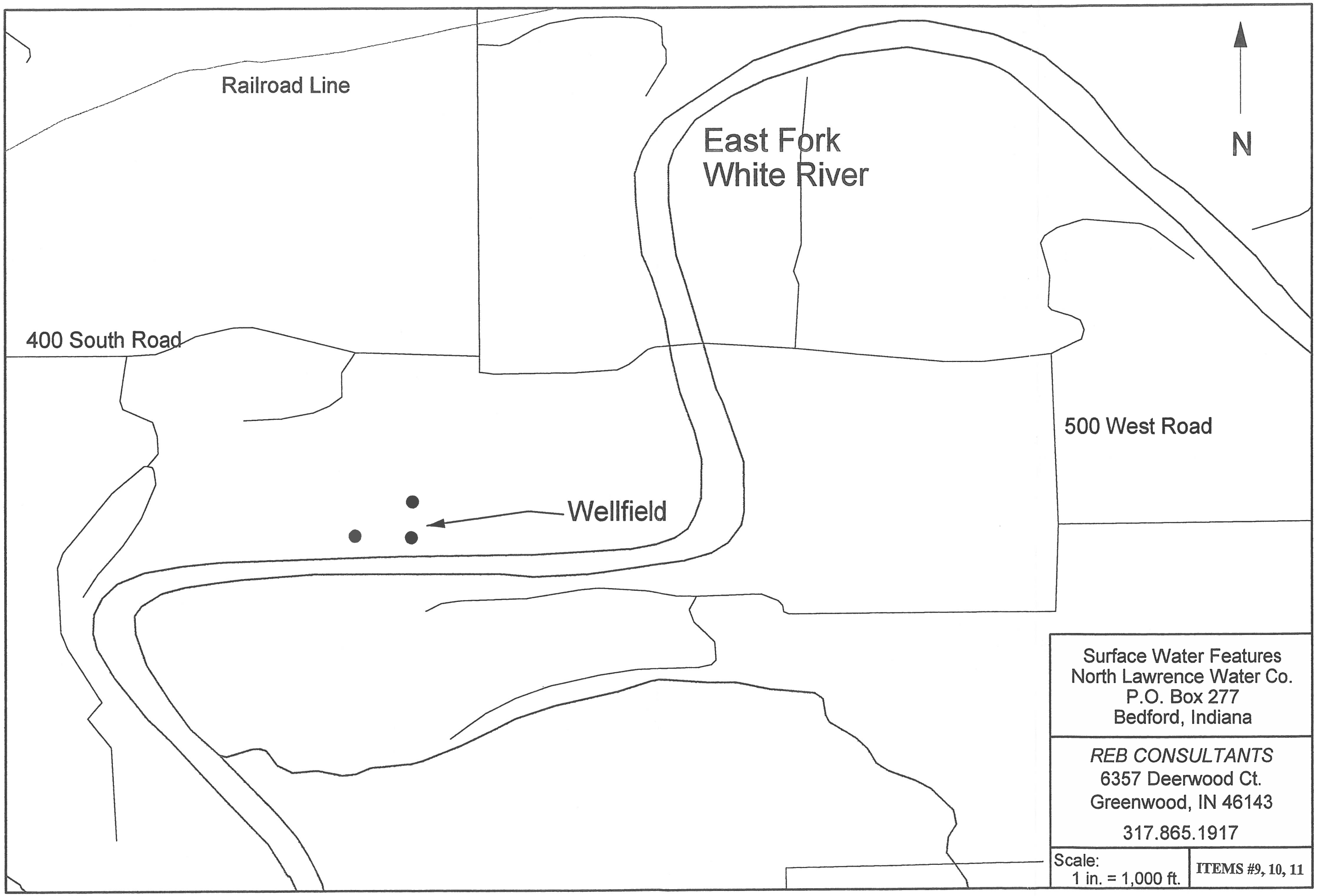
Philip Hawkins
(Print owner or representative name)

Philip Hawkins
(Owner or representative signature) 1-8-97 (date signed)

North Lawrence Water Company

North Lawrence Water Company - PLATE 1

Registered water withdrawal wells in area.
Line of wells in Cross Section.

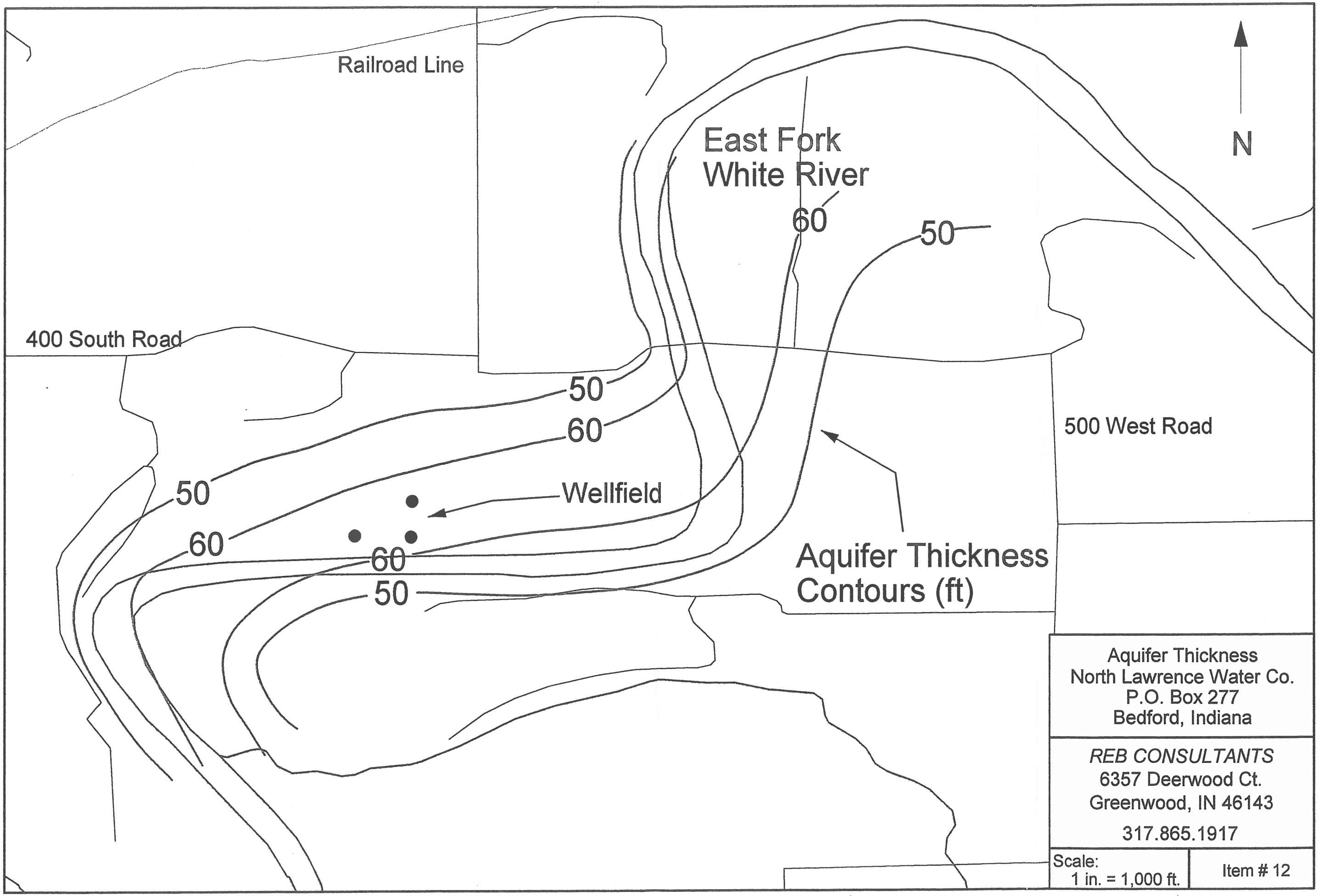


Surface Water Features
North Lawrence Water Co.
P.O. Box 277
Bedford, Indiana

REB CONSULTANTS
6357 Deerwood Ct.
Greenwood, IN 46143
317.865.1917

Scale:
1 in. = 1,000 ft.

ITEMS #9, 10, 11

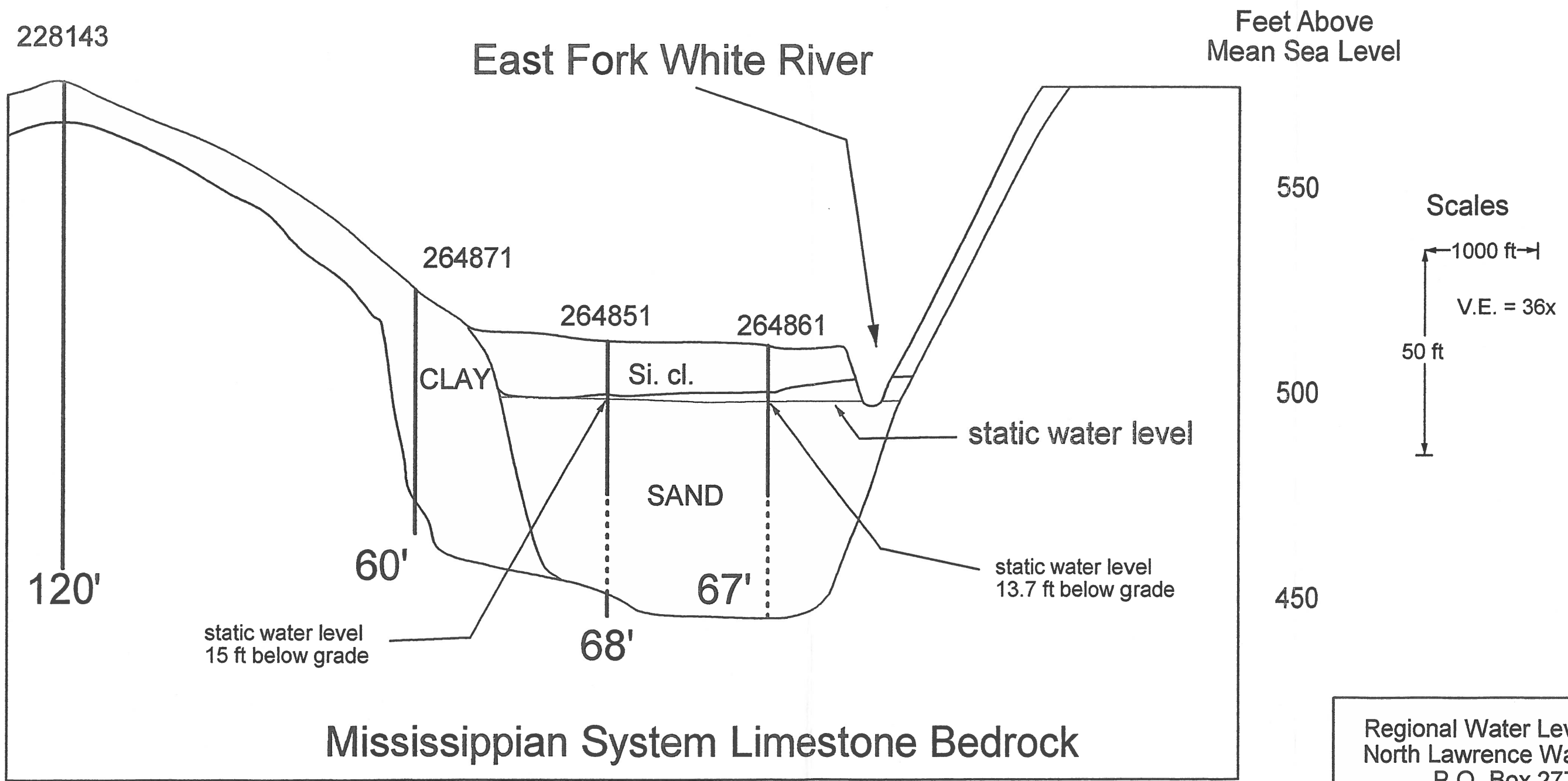


Aquifer Thickness
North Lawrence Water Co.
P.O. Box 277
Bedford, Indiana

REB CONSULTANTS
6357 Deerwood Ct.
Greenwood, IN 46143
317.865.1917

Scale:
1 in. = 1,000 ft.

Item # 12

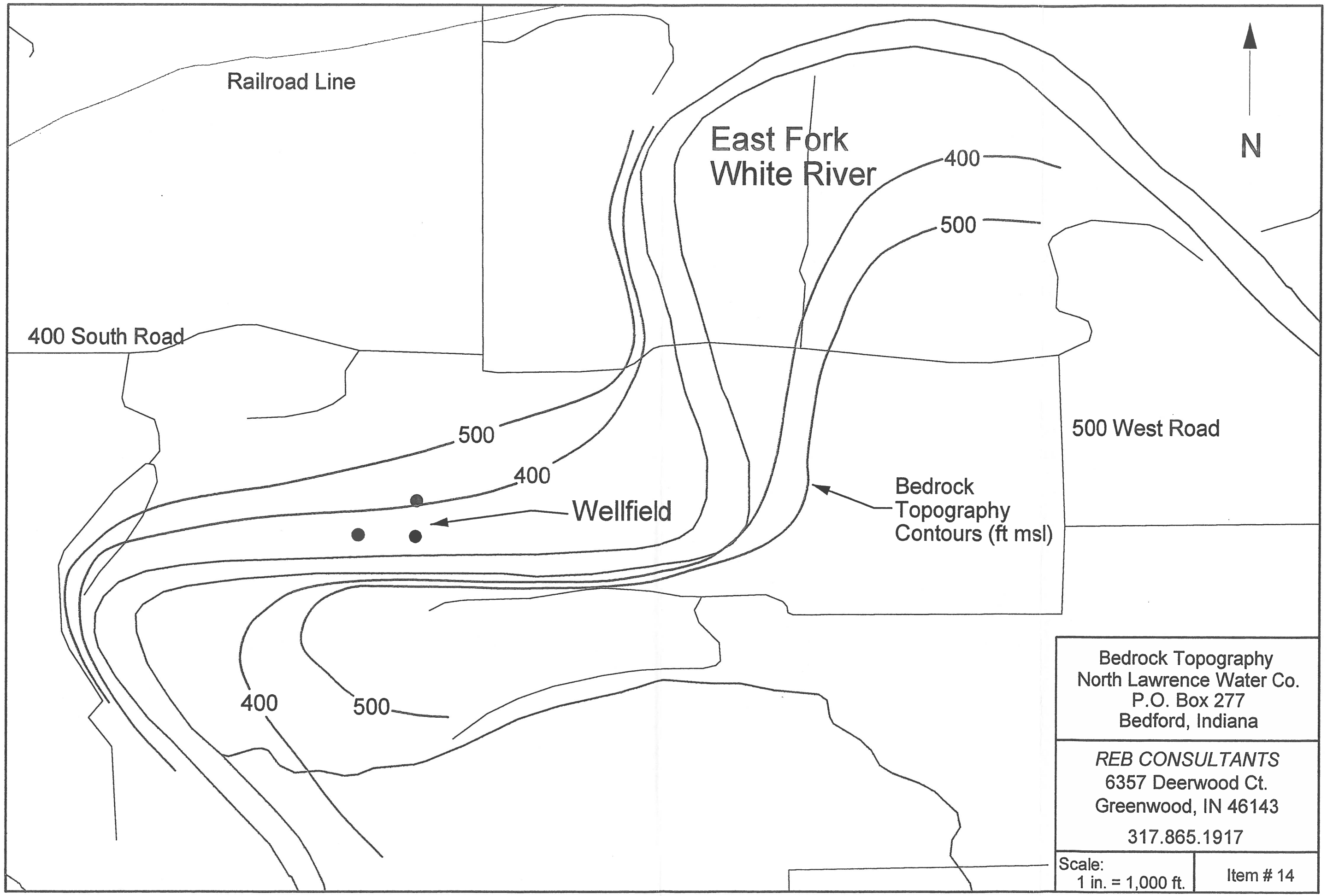


Regional Water Level Map
North Lawrence Water Co.
P.O. Box 277
Bedford, Indiana

REB CONSULTANTS
6357 Deerwood Ct.
Greenwood, IN 46143
317.865.1917

Scale:
As Shown

Item 13



Bedrock Topography
North Lawrence Water Co.
P.O. Box 277
Bedford, Indiana

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Greenwood, IN 46143
317.865.1917

Scale:
1 in. = 1,000 ft.

Item # 14