Appendix D—ACME Solvents and Winnebago Reclamation Landfill Sites Data

The ACME Solvents and Winnebago Reclamation Landfill sites (the ACME/WRL site) were the location of a series of environmental investigations between 1982 and 1990, with collection of data for routine monitoring ongoing. The investigations of concern for this discussion were conducted from 1988 through 1990 by Warzyn Engineering, Inc., and Harding-Lawson Associates. The USGS provided field oversight and an independent analysis of the data for the USEPA. Results of these investigations are presented in Warzyn Engineering, Inc, 1990; Harding-Lawson Associates, 1990; and Kay, 1991. These reports provide a detailed discussion of the hydrogeologic investigations at the ACME/WRL site. A total of 13 investigative methods were used to develop the hydrogeologic framework for the ACME/WRL site (table 9). Most of these methods contributed to the characterization.

Topographic and Aerial Photographic Analysis

Analysis of land-surface topography during site visits, and from topographic maps and aerial photographs, did not indicate the presence of fracture traces or sinkholes at the ACME/WRL site. It is presumed that these features were not identified because they are absent within the area of investigation, though the thick (more than 20 ft) unconsolidated deposits in parts of the ACME/WRL site may be masking their presence. Comparison of surface topography with bedrock topography indicated that topographic highs (not associated with the landfill) corresponded to areas where the bedrock is near the land surface.

Quarry Visits

The Dunleith Formation of the Galena Group is the only bedrock deposit exposed at the quarry north of the ACME Solvents site (fig. 21). Solution features were not observed, but vertical fractures were present. The strike of these vertical fractures ranged from N. 53° W. to N. 67° W., with a second set oriented between N. 18° E. to N. 44° E.

Lithologic Logs

Lithologic logs were done for all of the boreholes drilled during environmental investigations at the ACME/WRL site (tables 9, 10). The STI well series at the ACME site and the G well series at the WRL site were drilled for these investigations. The other wells were drilled as part of previous investigations. The only lithologic logs of use for characterization of secondary-permeability features were those for the STI series of wells drilled for the investigation at the ACME site, which were drilled using an air hammer. The remaining wells were drilled using a tricone roller, which tended to obscure the presence of permeable features because of its slow drilling rate in comparison to other drilling methods. It is impractical to recount the particulars of the logs for each well, but the logs indicate that the Galena-Platteville deposits primarily were competent dolomite yielding small amounts of water interspersed with occasional permeable zones indicative of fractures and vugs. The lithologic log for well STI-1D indicated fractures at 598, 665, and 690 FANGVD29 (table 11). The lithologic log for well STI-3D indicated fractures at about 633 and 713 FANGVD29. The lithologic log for well STI-4D indicated fractures at 666 and 700 FANGVD29. A dramatic decrease in the amount of rock return was observed below about 731 FANGVD29 at wells STI5I and 5D, with a complete loss of water and rock return at 641 FANGVD29, indicating the presence of a large fracture or solution opening near 731 FANGVD29. Vugs or fractures also were indicated at 707 FANGVD29 in well STI-5D. Secondary-permeability features were not identified from the remaining lithologic logs.

Core Analysis

The entire thickness of the Galena-Platteville dolomite (519-679 FANGVD29) was cored at a location about 50 ft east of well STI-SP2 (fig. 21). In addition, 20-ft sections of core were collected at the completion intervals for each of the STI-I and STI-D series of wells (table 9). Stratigraphic analysis of these cores (Harding-Lawson Associates, 1990; Michael Sargent, Illinois State Geological Survey, written comun., 1998) indicates that the Platteville and Galena Groups beneath the ACME/WRL site are composed of the Pecatonica (about from 519 to 543 FANGVD29 at well STI-SP2), Mifflin (about from 543 to 564 FANGVD29), Grand Detour (about from 564 to 603 FANGVD29), and Dunleith Formations (603 FANGVD29 to the bedrock surface)(figs. D1 and D2). The Nachusa, Quimbys Mill and Guttenberg Formations are not described in any of these cores, indicating the presence of an unconformity at about 603 FANGVD29 at well STI-SP2.

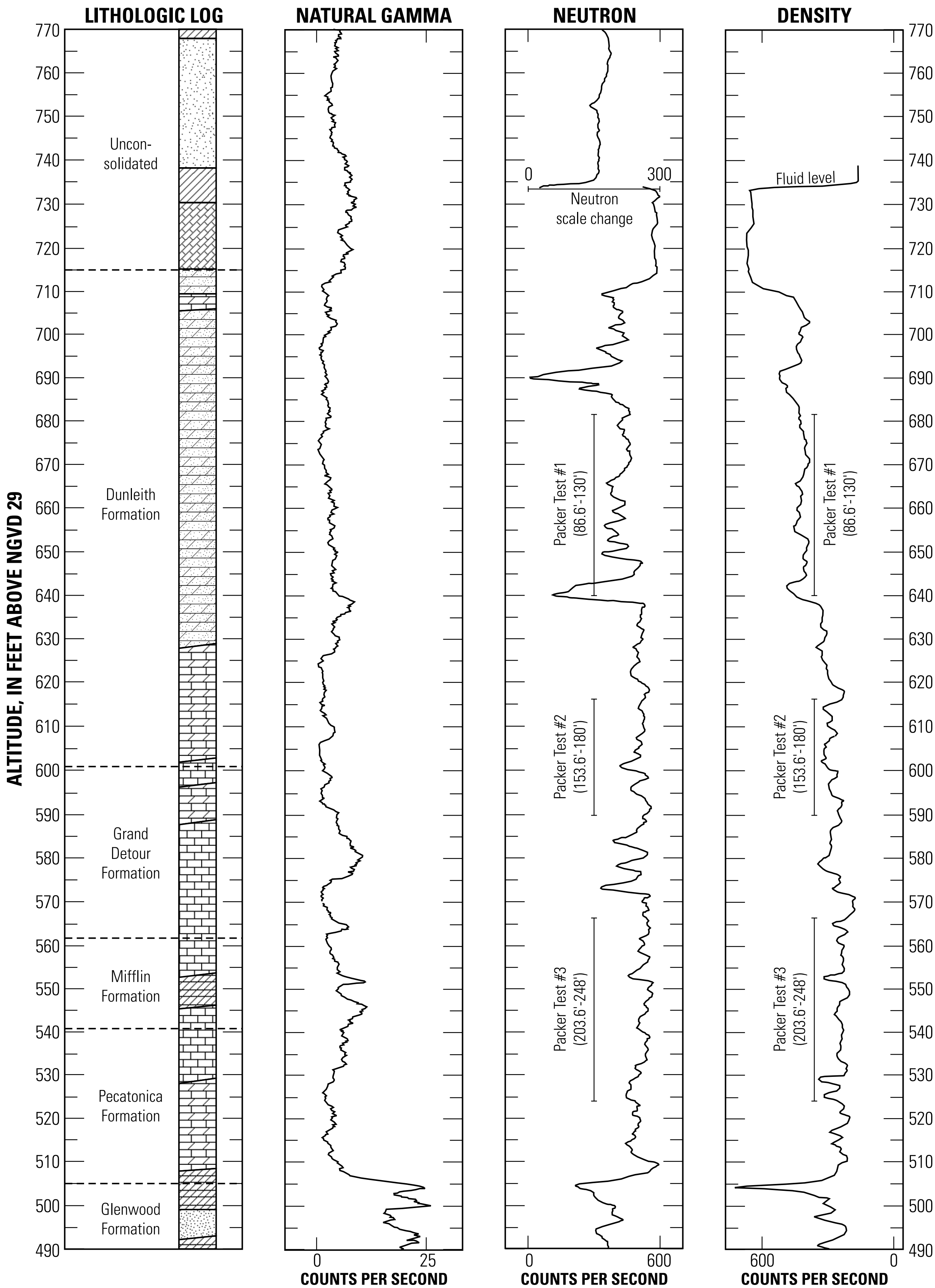

Figure D1. Lithology, stratigraphy, select geophysical logs, and packer-test intervals for borehole STI-SP2, Acme Solvents/Winnebago Reclamation Landfill sites, Ill.

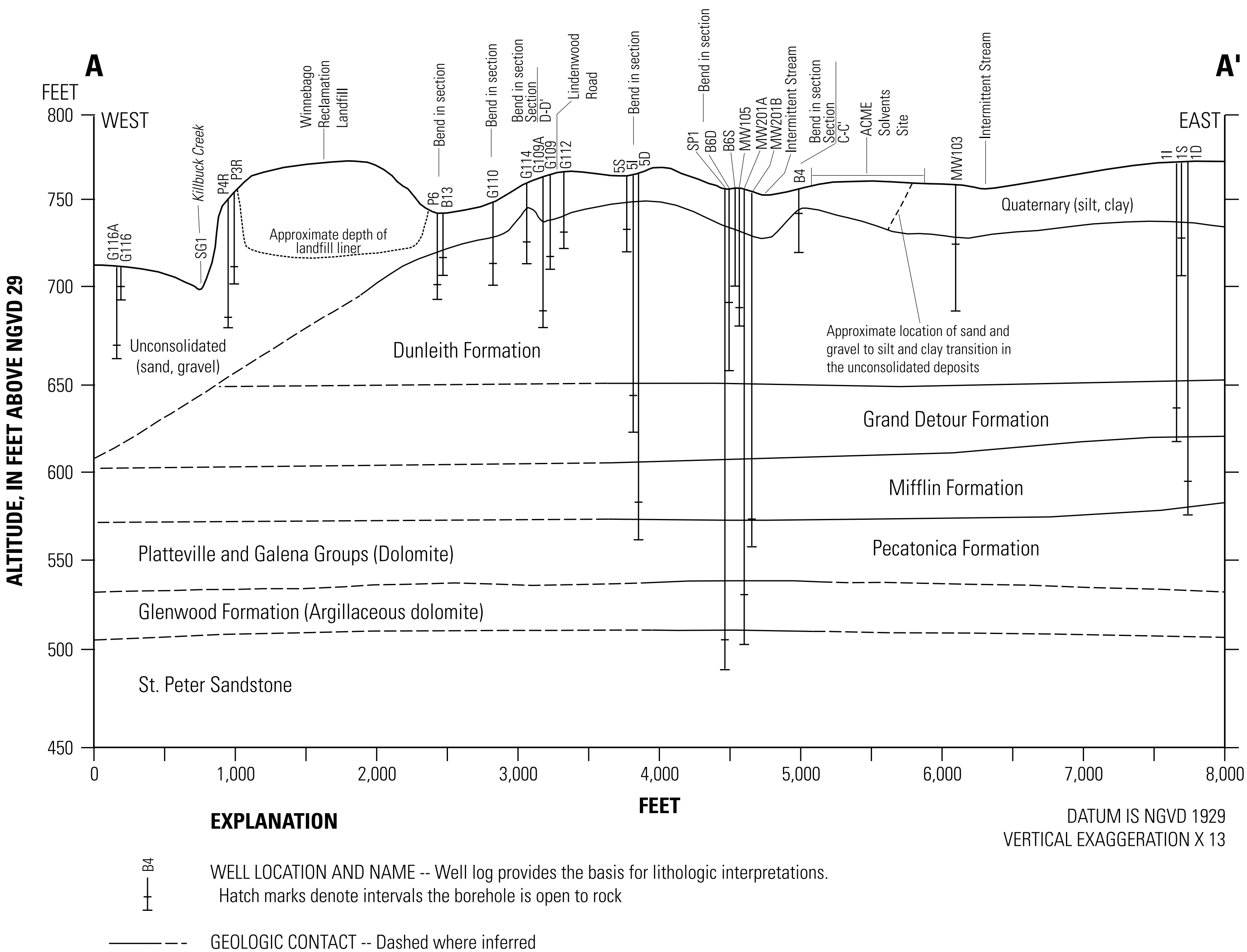

Figure D2. Geologic section A-A' at the ACME Solvents/Winnebago Reclamation Landfill sites, Ill. Line of section shown in figure 21.

Description of the core taken near well STI-SP2 indicates that the Galena-Platteville dolomite contains vertical and horizontal fractures at about 576-583 FANGVD29 (Grand Detour Formation), 625-634, 657-684, and 697-710 FANGVD29 (Dunleith Formation) with vuggy intervals at 625-634, 657-684, and 697-710 FANGVD29 (Dunleith Formation)(fig. D1). Comparatively competent dolomite was indicated for the uppermost 30 (Dunleith Formation) and lowermost 60 ft (Pecatonica and Mifflin Formations) of the Galena-Platteville dolomite.

Although not part of this investigation, a core was drilled in the quarry north of the ACME Solvents site and analyzed for stratigraphy by the quarry operator (Rockford Sand and Gravel, written commun., 2000). The reference altitude of this core was not provided, so the altitude of the features cannot be determined. The Dunleith Formation is about 150 ft thick at the quarry and is described as being underlain by about 4 ft of Guttenberg Formation, and by about 4 ft of the Quimbys Mill Formation. The Quimbys Mill Formation is underlain by the Grand Detour Formation. It is unclear if the discrepancy regarding the presence or absence of the Quimbys Mill and Guttenberg Formations at the quarry and at well STI-SP2 is related to the actual presence or absence of these formations in different parts of the ACME/WRL site, or differences between the interpretation of the persons doing the descriptions. However, lithologic logs from well STI-3D in the quarry indicate the presence of shale beds at about 603, 613, and 653 FANGVD29, which were not described in the other STI wells. The two deeper shale beds are about 165 and 155 ft below land surface, which is consistent with the depths described from the quarry core.

Geophysical Logs

Geophysical logs were run primarily at the deep well in the STI clusters at the ACME/WRL site (table 9). These logs expanded the geologic framework of the ACME/WRL site and provided part of the foundation for the hydraulic framework.

Borehole Camera

Borehole-camera logging in well B6PW generally showed competent rock with clearly identifiable subhorizontal fractures at about 609 and 677 FANGVD29 (table 11). Smaller, less distinctive fractures or bedding-plane partings were present between 668 and 679 FANGVD29 and between 700 and 720 FANGVD29. An inclined fracture was identified at about 650 FANGVD29.

Caliper

Single-arm caliper logs show enlargements in well diameter at about 667, 684, and 734 FANGVD29 in well STI-1D (table 11), at 732 FANGVD29 in well STI-4D, and at 729 FANGVD29 at well STI-5D. Single-arm caliper logs in well STI-3D tended to show general areas of enlarged wellbore diameter from 583 to 593, 664 to 676, at 719, and from 730 to 740 FANGVD29, as opposed to distinct, individual features. Single-arm caliper logs in wells STI-2D tended to show areas of enlarged wellbore diameter from 583 to 593, 664 to 676 , at about 719, and from 730 to 740 FANGVD29. Many of these enlarged areas may be fractures or solution openings, but it is more likely that these areas were enlarged during drilling (wash outs) and are not representative of secondary-permeability features. Areas where caliper data indicate potential fractures in a well usually are the same locations where lithologic logs indicate the presence of permeable features (table 11). Caliper logs run in the remaining logged wells showed little variation in diameter, indicating competent, unfractured, dolomite.

Natural gamma

Natural-gamma logs run in well STI-SP2 were compared to the stratigraphic description from the nearby core so the natural-gamma signal of the formations could be identified (fig. D1). Natural-gamma logs from wells STI-1D, 2D, 3D, 4D, 5D, and SP1 then were compared with natural-gamma logs from well STI-SP2 so the stratigraphy across the ACME/WRL site could be determined (fig. D2). Comparison of the natural-gamma signal with the stratigraphic interpretations for each of the wells indicates that the altitude of the contacts between the various formations in the Galena and Platteville Groups is variable. The contact between the Glenwood and Pecatonica Formations is at about 543 FANGVD29 at wells STI-SP1 and STI-3D, but decreases to about 505 FANGVD29 at well STI-SP2. The natural-gamma log from well STI-3D does not indicate that the Guttenberg and Quimbys Mills Formations are present near this well.

Neutron

The neutron log run in the borehole for well STI-SP1 prior to well installation shows an overall increase in counts per second (cps) from the top to the bottom of the Dunleith Formation, a slight decrease from the top to the bottom of the Grand Detour Formation, generally consistent response throughout the Mifflin Formation, decreasing cps in the upper part of the Pecatonica Formation, and similar cps in the lower part of the Pecatonica Formation. Neutron logs run in the borehole for well STI-SP2 (fig. D1) also show an overall increase in cps from the top to the bottom of the Dunleith Formation, a slight increase from the top to the bottom of the Grand Detour Formation, consistent response throughout the Mifflin Formation, and a small decrease in cps with depth in the Pecatonica Formation. Neutron logs run in the borehole for well STI-1D show a slight overall increase in cps from the top to the bottom of the Dunleith Formation, but generally were unchanged from the bottom part of the Dunleith Formation through the end of the log near the top of the Mifflin Formation. Neutron logs run in the borehole for well STI-2D also show little change from the lower part of the Dunleith Formation (the upper part is eroded in this area) through the Grand Detour Formation, then a slight decrease toward the Mifflin Formation near the bottom of the borehole. Neutron logs run in the borehole for well STI-3D show little change in the upper part of the Dunleith Formation, were elevated in the lower 20 ft of this formation, decreased with depth in the Grand Detour Formation, and generally were unchanged with depth in the Mifflin Formation at the end of the log. Neutron logs run in the borehole for well STI-4D show little change in the Dunleith Formation and increased slightly with depth through the Grand Detour Formation to the top of the Mifflin Formation at the bottom of the borehole. Neutron logs run in the borehole for well STI-5D show little change in the upper part of the Dunleith Formation, increase slightly in the lower 30 ft of this formation, and decrease slightly with depth in the Grand Detour Formation and the top of the Mifflin Formation at the end of the log.

Neutron logs at the ACME/WRL site showed no large, abrupt changes in cps readings that could be attributed clearly to fractures identified with the caliper or lithologic logs. Neutron logs showed some correlation with natural-gamma response, but this response was not evident in all of the wells, or at all depths within a given well. This lack of identifiable response to secondary-permeability features probably can be attributed to the effects of the variation in the clay mineral content of the dolomite and a lack of secondary-permeability features containing enough water to be detected over the ambient response.

Water-Level Measurements

Water levels were measured on a periodic basis. These measurements resulted in an improved understanding of the hydrology of the Galena-Platteville aquifer.

Periodic Measurements

Water levels were collected periodically from December 1984 through April 1990, with the most intensive effort from October 1988 through August 1989. Water levels were used to construct the water-table configuration and to determine the horizontal and vertical-hydraulic gradients within the Galena-Platteville aquifer so that a three-dimensional depiction of flow directions could be obtained. A major drought occurred in 1988-89 affecting water-table configuration from May 1989 through February 1990.

Water levels varied by less than 5 ft from April 1988 through April 1990. The largest variation (4.47 ft) was measured at well STI-3S. The smallest variation (1.79 ft) was measured at well B6D.

Water levels in wells open to the water table, the middle, and the base of the Galena-Platteville aquifer typically increased and decreased at the same time and typically by similar amounts during the period of measurement (fig. D3). These patterns indicate that the Galena-Platteville aquifer has sufficient vertical hydraulic interconnection to respond to ambient hydraulic effects as a single aquifer.

During typical (non-drought) conditions, such as were present at the site in November 1988, the water-table configuration indicates the direction of flow in the Galena-Platteville aquifer generally is from east to west toward Killbuck Creek, with a component of flow to the southwest (fig. 24). A ground-water divide is located north of the ACME Solvents site trending to the southeastern corner of the WRL. This divide corresponds to the location of the bedrock ridge (fig. 22).

During drought conditions, ground-water flow generally was from east to west toward Killbuck Creek (fig. 24), but the ground-water divide shifted south of the ACME site. This shift in the location of the ground-water divide appears to be in response to the comparatively large decline in water level north of the ACME Solvents site near well STI-3S, and the comparatively small decline south of the ACME Solvents site as indicated by the smaller change in water levels near well B6S. These differences in the amount of water-level decline may indicate that aquifer permeability north of the ACME Solvents site is higher than the aquifer permeability south of the site.

Examination of the water-table configuration for November 1988 (fig. 23) indicates that the horizontal hydraulic gradients, where the water table is in the Galena-Platteville aquifer, tend to be highest between the ACME Solvents and WRL sites (about 1×10^{-2} ft/ft) and lowest in the eastern part of the ACME Solvents site (about 6.5×10^{-4} ft/ft). These patterns in the horizontal hydraulic gradients indicate that the Galena-Platteville aquifer may be less permeable, and contain fewer interconnected secondary-permeability features in the area between the two sites than in the surrounding area.

Vertical differences in water level between the water table and the middle of the Galena-Platteville aquifer and between the middle and base of the Galena-Platteville aquifer typically are less than 10 ft. Vertical flow directions vary with depth and location, but flow is directed downward from the water table to the base of the aquifer beneath most of the area near the ACME Solvents site and beneath the southeastern part of the WRL. Flow is directed upward from the base of the aquifer to the water table south of the ACME Solvents site and northeast of the WRL. Not considering direction, vertical hydraulic gradients between the water table and the middle of the Galena-Platteville aquifer ranged from -8.1×10^{-4} to 2.4×10^{-2} ft/ft (table D1). Vertical-hydraulic gradients between the middle and base of the Galena-Platteville aquifer ranged from -1.4×10^{-4} to -1.3×10^{-2} ft/ft.

Vertical-hydraulic gradients in the Galena-Platteville aquifer at the ACME/WRL generally are low, which tends to indicate high vertical hydraulic conductivity within the aquifer. Analysis of these limited data does not indicate a substantial systematic variation in vertical hydraulic gradient with location or depth in the aquifer, indicating that the secondary-permeability network in this area does not vary substantially.

Aquifer tests

Slug tests and multiple-well constant-discharge aquifer tests were performed at the ACME/WRL site (table 9). Analysis of these tests provided the primary hydrogeologic insight into the nature of the secondary-permeability network at the site.

Slug tests

Kh values were obtained from slug tests performed in 33 monitoring wells open to the Galena-Platteville aquifer (table D2). Kh values obtained from the monitoring wells ranged from 0.024 ft/d in well STI-5D to 68 ft/d in well G111, with a geometric mean value of 0.72 ft/d. This range indicates that the Galena-Platteville aquifer is heterogeneous at the ACME/WRL site.

Kh values in the area defined approximately by well G114 and the B6, STI-5, and G113 well clusters (fig. 21) have a lower geometric mean value (0.15 ft/d) than the rest of the Galena-Platteville aquifer (2.1 ft/d). This area, hereafter referred to as the Low Permeability Area, is associated with a part of the bedrock ridge (fig. 22) and is likely to have a small number of interconnected secondary-permeability features in comparison to the remainder of the ACME/WRL site. This conclusion is consistent with the analysis of the spatial distribution of horizontal hydraulic gradients at the site.

Kh values determined from slug tests in 13 test intervals in boreholes open to the Galena-Platteville aquifer and isolated with a packer assembly ranged from 0.00022 to 26 ft/d, with a geometric mean value of 0.057 ft/d (table D3). The geometric mean and range of values from the test intervals isolated with a packer assembly are both substantially lower than the Kh values determined from the slug tests in the monitoring wells.

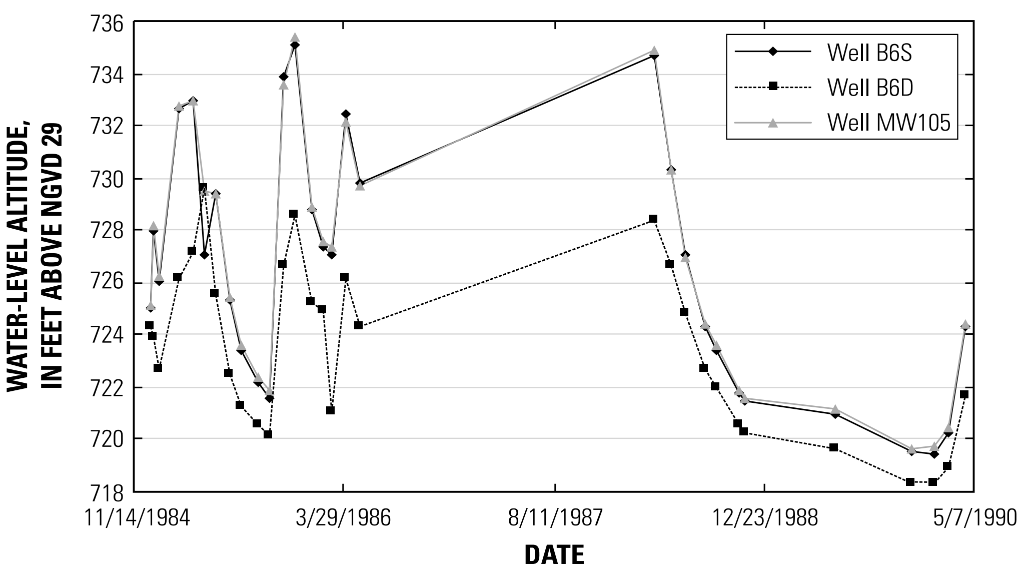

Figure D3. Hydrograph for wells B6S, B6D, and MW105, ACME Solvents/Winnebago Reclamation Landfill sites, Ill., November 14, 1984-May 7, 1990.

Table D1. Vertical hydraulic gradients, ACME Solvents and Winnebago Reclamation Landfill sites, Ill., November 1988.

[-, denotes potential for downward flow; ft/ft, foot per foot]

Well cluster	Calculated vertical hydraulic gradient (ft/ft)
	Water-table/middle of Galena-Platteville aquifer
STI1-S/1I	-6.5×10^{-3}
STI-2S/2I	1.9×10^{-3}
STI-3S/3I	-8.1×10^{-4}
STI-4S/4I	-1.7×10^{-2}
P8/P9	3.0×10^{-3}
B6S/B6D	-2.0×10^{-2}
B10/B10A	2.4×10^{-2}
B11/B11A	-1.1×10^{-2}
B13/P6	-1.5×10^{-2}
B16/B16A	-2.4×10^{-3}
G109/G109A	-1.8×10^{-3}
G113/G113A	-3.0×10^{-3}
Well cluster	**Middle/base of Galena-Platteville aquifer**
STI-1I/1D	7.2×10^{-3}
STI-2I/2D	4.0×10^{-3}
STI-3I/3D	-1.3×10^{-2}
STI-4I/4D	-1.4×10^{-3}
STI-5I/5D	-1.4×10^{-4}

Areas of high Kh values identified from the test intervals isolated with a packer assembly indicated a lack of correlation with potential permeable features identified by geophysical or lithologic logs at these boreholes. For example, the high Kh at 668-720 FANGVD29 at borehole STI-3D (table D2) is not indicated clearly with any other method (tables 11, 12). This result indicates the need to use methods that measure permeability directly. This lack of correlation, and the difference between Kh values obtained by use of a packer assembly and those calculated from the monitoring wells, results partly because of the comparatively large number of packer-test intervals in the Low Permeability Area where secondary-permeability features largely are absent, partly because some potential features (such as the potential fracture at 598 FANGVD29 at borehole STI-1D) were not subjected to aquifer testing, and partly because the long (typically 20 ft or more) test intervals isolated with the packer assembly may have obscured areas of elevated Kh within the test interval.

Multiple-Well, Constant Discharge Aquifer Tests

Multiple-well, constant-discharge aquifer tests were performed in wells STI-3I and B6PW.

Well STI-3I

The multiple-well, constant-discharge aquifer test was done in well STI-3I in June 1989. Water levels were monitored for 24 hours prior to the start of pumping in well STI-3I and for 24 hours after the cessation of pumping. Well STI-3I was pumped for 48 hours at a rate of about 4.9 gal/min with a water-level decline of about 60 ft. Water levels were measured in wells STI-3S, STI-3D, B1, B2, STI-1S, STI-1I, STI-1D, STI-4S, STI-4I, STI-4D, B6S, MW201B, and STI-SP1 during all phases of the test.

Aside from well STI-3I, drawdown was not detected in any well, including wells STI-3S and 3D. Wells STI-3S and 3D are open to the Galena-Platteville aquifer about 110 ft above and 37 ft below the open interval at well STI-3I, respectively. The absence of drawdown at wells STI-3S and 3D indicates moderate to high vertical hydraulic conductivity in the Galena-Platteville aquifer at this well cluster, which is contrary to interpretations drawn from analysis of vertical hydraulic gradient data.

A semi-log analysis of the water-level data from well STI-3I (Cooper and Jacob, 1946) resulted in a calculated transmissivity of about 42 ft^2/d and a Kh of 2.1 ft/d (Harding-Lawson Associates, 1990). The semi-log plot of the drawdown data indicated that the drawdown rate decreased during the later stages of the test. This decrease could indicate a lessening of well loss because of well development resulting from pumping, or the induction of flow to the well from a permeable fracture or vuggy zone away from the test interval.

Well B6PW

The multiple-well, constant-discharge aquifer test was done in well B6PW in September 1989. Water levels were monitored for 18 hours prior to the start of pumping, and for 48 hours after the cessation of pumping. Well B6PW was pumped for 48 hours at a rate of about 1.9 gal/min. Well B6PW was open to the Galena-Platteville aquifer from about 589 to 722 FANGVD29. Water levels were measured in wells B6S, B6D, MW105, MW201A, MW201B, STI-SP1, STI-5I, STI-5D, B4, B7, B9, G101, MW202, STI-3S, STI-3I, and STI-3D during all phases of the test.

Analysis of the water-level data in well B6PW indicated about 100 ft of drawdown during pumping. Substantial increases in the rate of drawdown were observed when water levels in the well were about 688, 662, and 640 FANGVD29 (fig. D4). These increases are

Table D2. Horizontal hydraulic conductivity values calculated from slug testing in monitoring wells open to the Galena-Platteville aquifer, ACME Solvents and Winnebago Reclamation Landfill sites, Ill.

Well name (fig. 21)	Calculated horizontal hydraulic conductivity (feet per day)
B4	1.3
B6S	.49
B6D	.030
B7	1.5
B9	1.1
B10	.20
B10A	5.4
B11	1.5
B11A	.32
B12	.16
B13	4.0
B16	1.5
B16A	.48
G101	40
G108	7.9
G109	.60
G109A	.015
G110	4
G111	68
G113	.40
G113A	.15
G114	.19
MW104	2.9
MW105	.22
MW201B	.058
MW202	1.8
P8	5.1
P9	1.5
STI-5S	.48
STI-5I	.039
STI-5D	.024
STI-6S	3.7
STI-7I	.037

attributed to the effects of dewatering fractures intercepting the pumped well near or above these altitudes. The precise features that were dewatered to produce the increase in drawdown cannot be identified from these data. However, analysis of the borehole camera log indicated that one or more of the subhorizontal fractures from 700 to 720 FANGVD29, 668 to 679 FANGVD29 and an inclined fracture at about 650 FANGVD29 (tables 11, 12) may be the contributing features.

Drawdown was measured in wells B6S (1.5 ft), B6D (1.8 ft), MW105 (5.3 ft), and MW201B (0.25 ft) during the aquifer test. Well MW105 reached maximum drawdown about 5.7 hours into the test, then rose slightly for the remainder of the pumping phase. Well MW105 is

Table D3. Horizontal hydraulic conductivity values calculated from slug testing in test intervals isolated with a packer assembly, ACME Solvents and Winnebago Reclamation Landfill sites, Ill.

Borehole name (fig. 21)	Altitude of test interval (feet above National Geodetic Vertical Datum of 1929)	Calculated horizontal hydraulic conductivity (feet per day)
STI-1D	675-687	0.12
	616-637	.12
STI-3D	688-720	26
	639-660	.20
STI-4D	663-680	.12
STI-5D	661-681	.019
	622-672	.0093
	582-615	.45
STI-SP1	623-665	.0081
	572-597	.00022
STI-SP2	640-681	.30
	590-616	.0066
	524-566	.026

open to the Galena-Platteville aquifer between 654 and 690 FANGVD29 (table 10). Well B6D is open to the aquifer between 654 and 717 FANGVD29. Well B6S is open to the aquifer between 706 and 719 FANGVD29. Well MW201B is open to the base of the Galena-Platteville aquifer between 555 and 575 FANGVD29. The drawdown pattern illustrates that most of the flow to the well was through the fractures between 668 and 679 FANGVD29, and probably primarily through the fracture at 677 FANGVD29 identified with the borehole camera log at well B6PW (tables 11, 12).

The remaining observation wells, including wells MW201A and STI-SP1 in the B6 well cluster, did not respond to pumping. Wells MW201A and STI-SP1 are open to the Glenwood Formation semiconfining unit and the St. Peter aquifer, respectively.

Transmissivity values calculated from the time-drawdown data from wells B6S, B6D, and MW105 were 46, 61, and 10 ft^2/d, respectively (Harding-Lawson Associates, 1990), with a geometric mean value of 30 ft^2/d using the method of Black and Kipp (1981). Because the well with the largest amount of drawdown, and (presumably) the best hydraulic communication with the fracture network had the lowest calculated transmissivity, the assumption of aquifer homogeneity for the Black and Kipp (1981) method appears to have introduced error to the transmissivity estimate. The geometric mean value for the storage coefficient was 7.8×10^{-4}.

The mean Kh value calculated from the well B6PW aquifer-test data was 0.2 ft/d. This value is consistent

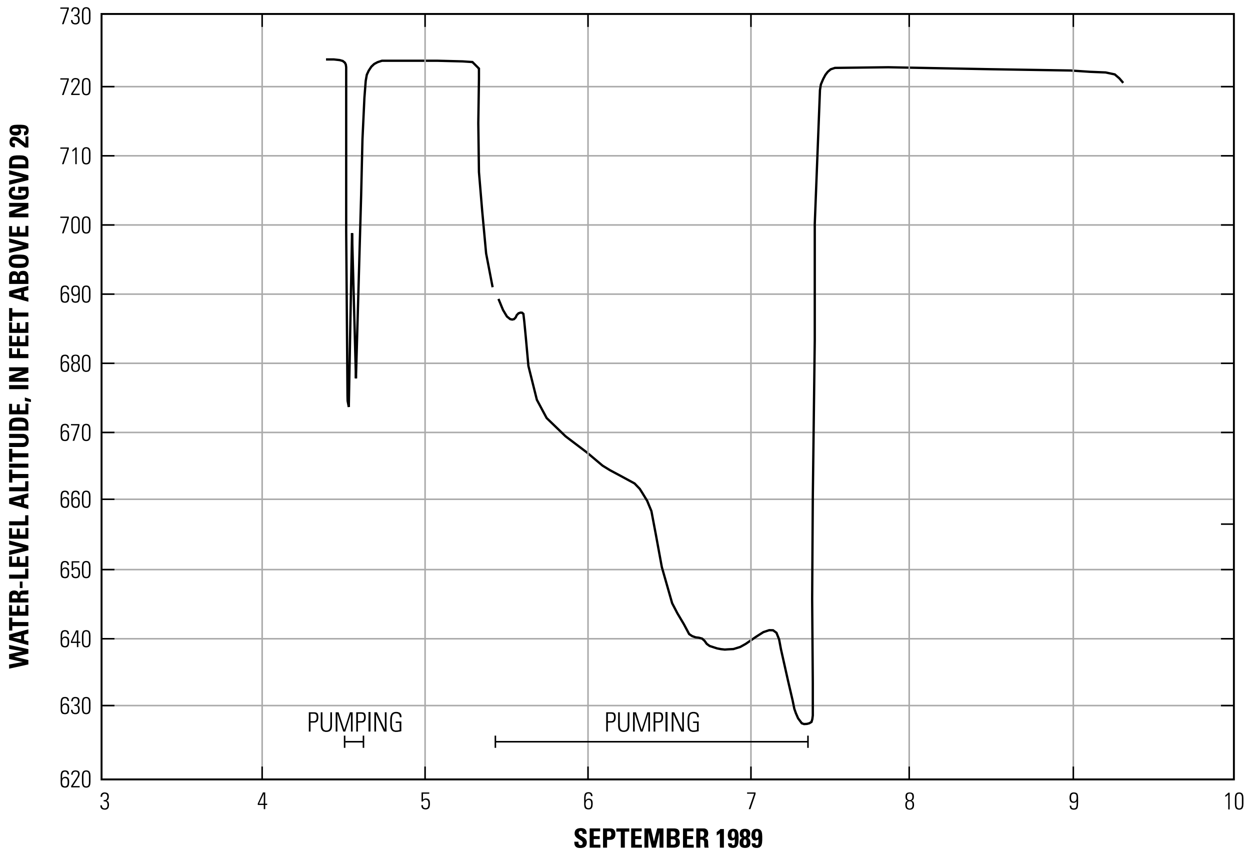

Figure D4. Hydrograph of well B6PW during aquifer testing, ACME/Water Reclamation Landfill site, Ill., September 1989.

with the geometric mean Kh (0.15 ft/d) obtained from the slug tests in the Low Permeability Area.

Well B6PW is within the Low Permeability Area defined by the slug testing. The low transmissivity and large of drawdown in response to a low pumping rate confirms the low permeability of the aquifer in this area.

The presence of drawdown at well MW201B (open about 15 ft below the bottom of well B6PW) indicates some vertical hydraulic interconnection within the aquifer in this area. An analytical solution was used to simulate the time-drawdown data from well MW201B. The model-simulated ratio of horizontal to vertical hydraulic conductivity in the Galena-Platteville aquifer is between 5 and 100 (Harding-Lawson Associates, 1990). Coupled with the low Kh of the area, this ratio indicates the presence of minimal vertically transmissive features in the lower part of the aquifer near well B6PW. These results are inconsistent with the interpretations drawn from the water-level data, which indicate moderate to high vertical hydraulic connection in the Galena-Platteville aquifer.

Location of Contaminants

Water-quality data shows VOC’s in ground water from the northeastern part of the ACME Solvents site west to Killbuck Creek (fig. 25). This movement of VOC’s is in the general direction of ground-water flow defined with the water-level measurements. VOC’s are present at depth at the STI-2 cluster, which also is located in the general direction of ground-water flow and along one of the primary directions of the vertical fractures in the Galena-Platteville aquifer. The area between the ACME Solvents site and the WRL corresponding to a part of the Low Permeability Area tends to have lower concentrations of VOC’s near the water table and in the upper part of the Galena-Platteville aquifer. The low concentration of VOC’s between the ACME Solvents site and the WRL may be attributed to dilution from periodic recharge from the intermittent stream south of ACME Solvents and variations in aquifer permeability resulting in preferential ground-water flow around the Low Permeability Area.

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