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Final Work Plan: Phase I Investigation at Eustis, Nebraska

Environmental Science Division

USDA United States Department of Agriculture

Work sponsored by Commodity Credit Corporation,
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Final Work Plan: Phase I Investigation at Eustis, Nebraska

by
Applied Geosciences and Environmental Management Section
Environmental Science Division, Argonne National Laboratory

May 2013

United States Department of Agriculture

Work sponsored by Commodity Credit Corporation,
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Notation

AGEM	Applied Geosciences and Environmental Management
AMSL	above mean sea level
BGL	below ground level
BTEX	benzene, toluene, ethylbenzene, and xylene
ºC	degree(s) Celsius
CCC	Commodity Credit Corporation
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	CERCLA Information System
CLP	Contract Laboratory Program
CPT	cone penetrometer
E&E	Ecology and Environmental, Inc.
EPA	U.S. Environmental Protection Agency
ft	foot (feet)
gal	gallon(s)
GC-MS	gas chromatography-mass spectrometry
gpm	gallon(s) per minute
GSI	Geotechnical Services, Inc.
h	hour(s)
I.D.	inner diameter
IDW	investigation-derived waste
in.	inch(es)
LUST	leaking underground storage tank
MCL	maximum contaminant level
µg/L	microgram(s) per liter
mg/L	milligram(s) per liter
mi	mile(s)
min	minute(s)
NDEQ	Nebraska Department of Environmental Quality
NDHHS	Nebraska Department of Health and Human Services
PRT	Post-Run Tubing
PVC	polyvinyl chloride
PWS	public water supply
TCLP	toxicity characteristic leaching procedure
TRPH	total recoverable petroleum hydrocarbon

USDA	U.S. Department of Agriculture
VOC	volatile organic compound
WhAEM	Wellhead Analytic Element Model
WHP	Wellhead Protection (Program)
WHPA	wellhead protection area
yr	year(s)

Draft Work Plan: Phase I Investigation at Eustis, Nebraska

1 Introduction

The village of Eustis is located in the northeast corner of Frontier County, Nebraska (Figure 1.1), near Interstate 80 and approximately 190 mi west of Lincoln. From 1950 to 1964, the Commodity Credit Corporation (CCC), an agency of the U.S. Department of Agriculture (USDA), operated a grain storage facility at the southeastern edge of Eustis. During this time, commercial grain fumigants containing carbon tetrachloride were in common use to preserve grain in storage. In July 2011, the Nebraska Department of Health and Human Services (NDHHS) calculated a running annual average concentration of carbon tetrachloride in groundwater from one of the Eustis public water supply wells (PWS 70-1) at 5.24 µg/L, exceeding the maximum contaminant level (MCL) of 5.0 µg/L. The running average value was calculated on the basis of results (4.01-6.87 µg/L) from four groundwater sampling events in 2011 for well PWS 70-1 (NDHHS 2011). On January 16, 2012, the village placed well PWS 70-1 on backup/standby status for emergency use only (Village of Eustis 2012).

In March-July 2012, the Remediation Section of the Nebraska Department of Environmental Quality (NDEQ) conducted a "desktop" pre-CERCLIS site screening assessment (NDEQ 2012). In this assessment, the NDEQ (1) confirmed the location of the former CCC/USDA grain storage facility in the southeastern part of Eustis; (2) determined that the source of contamination (carbon tetrachloride and its breakdown product, chloroform) detected in the public water supply wells is unknown; (3) requested sampling of groundwater in private wells in the vicinity of the public supply wells, at the former Farmland Service Coop (currently All Points Cooperative) property (where carbon tetrachloride was found in monitoring wells; see details in Section 2), and at the former CCC/USDA facility; and (4) recommended further site assessment (NDEQ 2012). On June 30, 2012, the CCC/USDA sampled 13 private wells for carbon tetrachloride and chloroform analyses. No contamination was identified in the private wells tested.

Because carbon tetrachloride found in well PWS 70-1 might be linked to historical use of fumigants containing carbon tetrachloride at the former grain storage facilities at Eustis, and because the former CCC/USDA grain storage facility is one of two grain storage facilities near well PWS 70-1 (Figure 1.2), the CCC/USDA is proposing investigations (1) to delineate the source and extent of the carbon tetrachloride contamination potentially associated with its former facility, (2) characterize pathways and controlling factors for contaminant migration in the

subsurface, and (3) establish a basis for estimating potential health and environmental risks. The work will be performed in accordance with the Intergovernmental Agreement established between the NDEQ and the Farm Service Agency of the USDA.

The site investigation at Eustis will be implemented in phases, so that data collected and interpretations developed during each phase can be evaluated to guide the subsequent phase of investigation effectively. This *Work Plan* identifies the specific technical objectives and defines the scope of work proposed for the Phase I investigation by compiling and evaluating historical data. The proposed investigation activities will be performed on behalf of the CCC/USDA by the Environmental Science Division of Argonne National Laboratory. Argonne is nonprofit, multidisciplinary research institute operated by UChicago Argonne, LLC, for the U.S. Department of Energy.

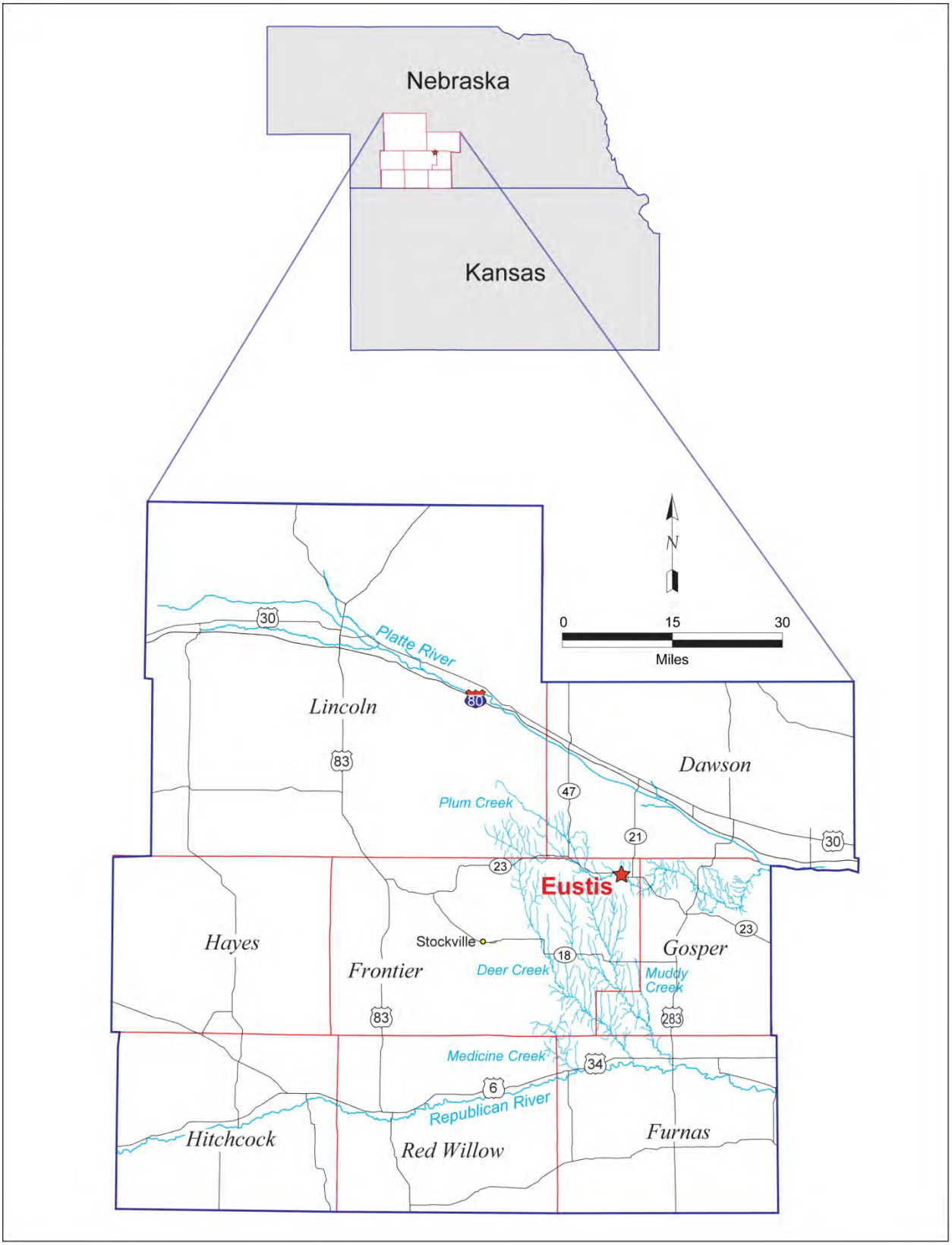

FIGURE 1.1 Location of Eustis, Nebraska.

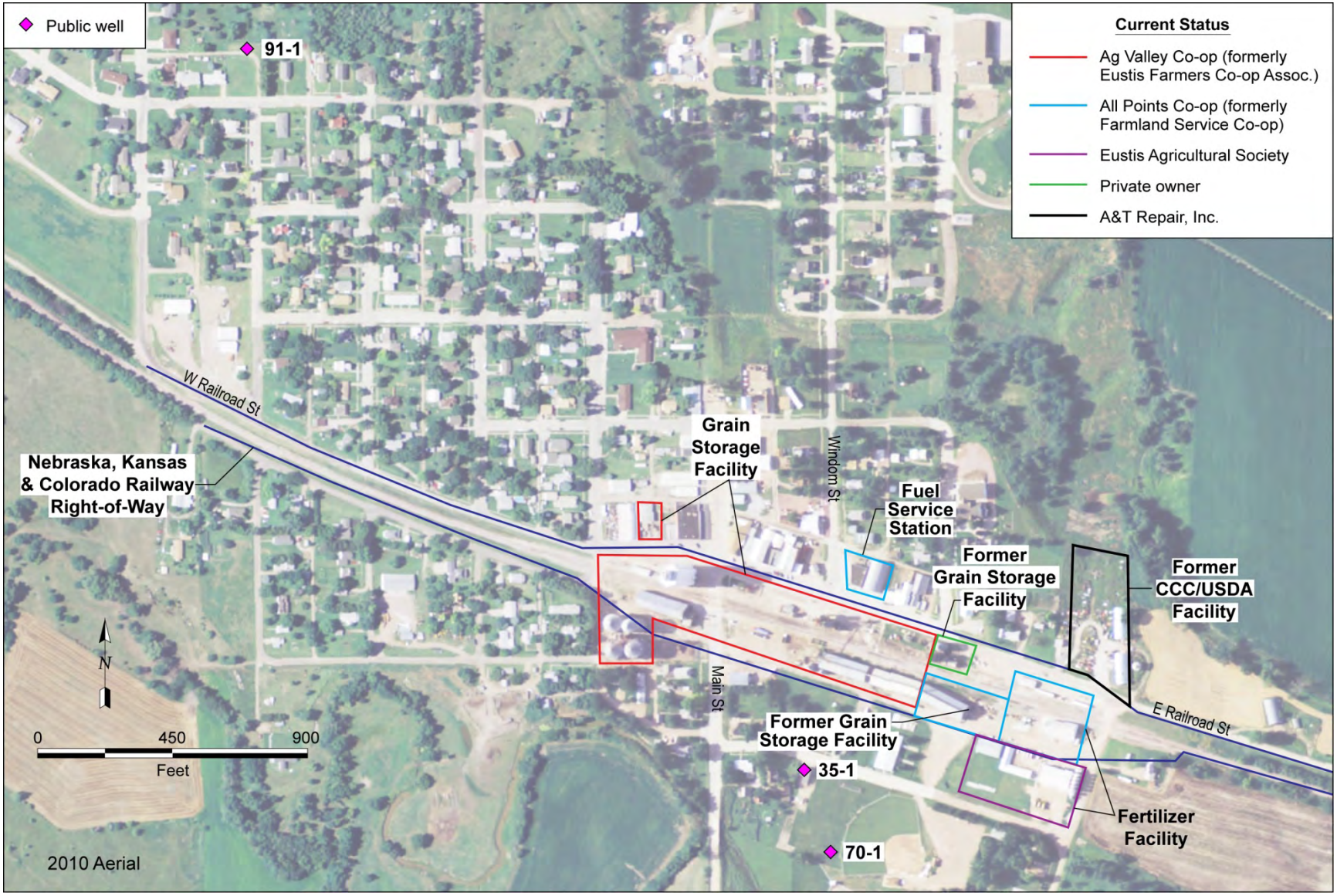

FIGURE 1.2 Locations of the former CCC/USDA facility, nearby agricultural business facilities, and public water supply wells.

2 Background and Previous Studies

2.1 Site Background

2.1.1 Area Description

Eustis is a small village located in northeastern Frontier County, Nebraska, in Section 15, Township 8 North, Range 24 West, approximately 10 mi south of Interstate 80. The village has numerous small businesses and local agricultural services, including the Ag Valley Coop (formerly the Farmers Cooperative Association) and the All Points Cooperative (illustrated in Figure 1.2). The village also hosts the Eustis-Farnam public schools, a medical center, a library, churches, recreation facilities, and an agricultural society. The state legislature designated Eustis the Sausage Capital of Nebraska in 1893.

The 2010 Census recorded 401 residents in 205 housing units in the village of Eustis. The village is served by a public water supply system that obtains its water from two groundwater wells (PWS 70-1 and PWS 91-1) within the village limits (Figure 1.2). Well PWS 70-1 was placed on backup/standby status for emergency use only in January 2012. The village is governed by a mayor and a village council.

Two major agricultural service companies, the Ag Valley Coop and the All Points Cooperative, are currently located along or adjacent to the railroad right-of-way (Figure 1.2). The Ag Valley Coop at Eustis provides grain storage, management, and wholesale services. The All Points Cooperative at Eustis mainly provides services associated with the supply of liquid fertilizer, fuel, pesticides, seed, etc. The former CCC/USDA grain storage facility was located across East Railroad Street from the northeastern corner of the All Points Cooperative property (Figure 1.2). The former CCC/USDA property is currently owned by A & T Auto Repair.

2.1.2 Eustis Public Water Supply

The village of Eustis has had three public water supply wells (35-1, 70-1, and 91-1). Well PWS 35-1, the oldest of these, was abandoned after PWS 90-1 was installed. After 1991, the public water supply system was supported by wells PWS 70-1 and PWS 91-1 until January 2012.

Wells PWS 70-1 and PWS 91-1 are approximately 3,300 ft apart. Well PWS 70-1 is roughly 500 ft south of the Ag Valley Coop facility, while well PWS 91-1 is approximately 2,200 ft northwest of that facility (Figure 1.2). Because of several detections of carbon tetrachloride at well PWS 70-1, resulting in a running average concentration of carbon tetrachloride exceeding the MCL in 2011, this well has been on backup/standby status for emergency use since January 2012. Currently, the village is planning to construct a new public water supply well to support its only active well, PWS 91-1. The proposed location for the new well is approximately 2,000 ft northwest of PWS 91-1, near the northwestern edge of the village. The new well will provide a second active clean water source for the village.

Before the use of well PWS 70-1 was disconnected in 2012, wells PWS 70-1 and PWS 91-1 were operated alternately, on a weekly or biweekly cycle (NDEQ 2012). Pumping records for the past 15 yr (Koch 2012) indicate a monthly average daily pumping volume ranging from 57,000 gal in December 2011 to 568,000 gal in July 1997. Wells PWS 70-1 and PWS 91-1 were both installed in the Ogallala aquifer, each with two screen intervals targeting permeable sections at different depths. Well PWS 70-1 has a total depth of 320 ft, while PWS 91-1 has a total depth of 380 ft. The pumping capacities are reported as 750 gpm for well PWS 91-1 and 570 gpm for well PWS 70-1 (NDEQ 2012).

Groundwater from wells PWS 70-1 and PWS 91-1 was tested for volatile organic compounds (VOCs) every year or two in 1990-2008 and has been tested quarterly since 2008. The analytical results for carbon tetrachloride and chloroform are in Table 2.1. As of July 2012, carbon tetrachloride had been detected in 17 of 21 sampling events for well PWS 70-1 (at 0.47-6.87 µg/L) and 6 of 15 sampling events for well PWS 91-1 (at 0.46-5.34 µg/L). The first detections above 1.0 µg/L occurred on May 5, 2008, for well PWS 70-1 and on May 10, 2010, for well PWS 91-1. Chloroform was found at a much lower, trace level in only a few sampling events (< 1 µg/L, except for one result [1.46 µg/L] in January 2011 for well PWS 70-1).

Figure 2.1 illustrates the trend of carbon tetrachloride concentrations at well PWS 70-1 and their correlation with the well's monthly pumping volumes in 2008-2012. Elevated carbon tetrachloride concentrations appear to be associated primarily with relatively low monthly pumping volumes (< 1.5 million gallons) in the winter (December and January) or abnormally low pumping volumes in April 2008 (< 0.5 million gallons) and June 2011 (approximately 1 million gallons). This apparent inverse correlation between the concentration of carbon tetrachloride and the pumping volume could result from many factors, such as the vertical and

lateral configuration of the contaminant plume in groundwater, changes in the capture zone with pumping rate, and variations in hydraulic conductivity within the aquifer. The results for well PWS 91-1 show a similar correlation (not illustrated). In addition, the maximum concentration of carbon tetrachloride for each year at well PWS 70-1 has shown a slightly increasing trend, from approximately 4 µg/L (2008-2010) to roughly 7 µg/L (2011-2012; Figure 2.1).

2.1.3 Wellhead Protection Area for the Public Water Supply Wells

The NDEQ Wellhead Protection (WHP) Program has developed a wellhead protection area (WHPA) for each public water supply system in Nebraska. In March 2011, the NDEQ revised the WHPA map for the Eustis system. The revised WHPA map and data used to develop the WHPA are in Appendix A.

In development of the WHPA for the Eustis public water supply system, the NDEQ determined that the local groundwater flow is to the south-southwest, on the basis of water level data collected from 55 water wells in the surrounding area. In addition, the NDEQ assumed (1) that the aquifer has a thickness of 140 ft, hydraulic conductivity of 54.2 ft/day, and porosity of 0.15 and (2) that two public water supply wells withdraw groundwater at constant rates of 34 gpm and 42 gpm, respectively, for 20 yr. The time-of-travel lines for water particles captured by the pumping wells were created by using the U.S. Environmental Protection Agency (EPA) Wellhead Analytic Element Model (WhAEM2000; EPA 2013). The WHPA was drawn slightly larger than the 20-yr time-of-travel lines to allow for seasonal changes and some natural variability in the aquifer (Appendix A).

The WHPA and the 20-yr time-of-travel lines derived by the NDEQ suggest that (1) all of the former and current grain storage facilities are located within the WHPA upgradient of well PWS 70-1; (2) some facilities and parts of facilities, including the western portion of the Ag Valley Coop (formerly the Farmers Cooperative Association) grain storage facility and the former CCC/USDA facility, are not within the estimated time-of-travel lines captured by the pumping of well PWS 70-1; and (3) no known grain storage facility is located within the WHPA upgradient of well PWS 91-1. As indicated by the NDEQ WHP Program, however, the predicted WHPA is based on general, homogeneous assumptions and might not represent the actual capture zones of pumping wells under site-specific pumping configurations in a heterogeneous aquifer.

2.2 Previous Investigations

Several sampling events and investigations have tested for the presence of VOCs in groundwater at Eustis. The main investigation activities are as follows:

- Investigations at a leaking underground storage tank (LUST) site on the former Farmland Service Coop property in 1990-1995
- A pre-CERCLIS site screening assessment conducted by Ecology and Environmental, Inc. (E&E), for the EPA in 1996
- Private well sampling conducted by Woodward Clyde for the CCC/USDA in 1997
- A pre-CERCLIS site screening assessment conducted by the NDEQ in March-July 2012
- Private well sampling conducted by Argonne for the CCC/USDA in June 2012, 15 yr after the Woodward Clyde sampling

The results of the previous investigations are discussed below.

2.2.1 Investigations of a Leaking Underground Storage Tank Site on the Former Farmland Service Coop Property in 1990-1995

In 1990, a problem with LUSTs was identified at the fuel service station formerly operated by the Farmland Service Coop at the northeastern corner of the intersection of East Railroad and Windom Streets (Figure 2.2). The property is currently owned by the All Points Cooperative. This LUST site is across East Railroad Street from the former Farmers Cooperative Association grain storage facility and about 800 ft west of the former CCC/USDA grain storage facility. The fuel releases from the LUST site resulted in contamination of soil and groundwater by petroleum constituents.

2.2.1.1 GSI LUST Investigations in 1990-1991

In 1990, Geotechnical Services, Inc. (GSI), removed five underground storage tanks and fuel lines and drilled one borehole (DH-1) to a depth of 110 ft in the excavation area. In 1991, GSI conducted a hydrogeologic assessment on behalf of the property owner at that time (the Farmland Service Coop). The assessment included soil sampling, installation of four additional monitoring wells (DH-2 through DH-5), collection of groundwater samples from the monitoring wells, and measurement of groundwater levels to determine the local flow direction.

Groundwater was encountered at approximately 105 ft below ground level (BGL), in a losses (silt and silty clay) unit. The loess unit is considered a confining layer overlying a sand and sandstone layer — the regional aquifer (Section 3) that provides water to the public water supply wells. GSI (1991) reported groundwater flow in the loess unit generally toward the south-southwest, with a gradient of approximately 0.003 ft/ft. GSI also determined a hydraulic conductivity (*K*) value of 0.3 ft/day, on the basis of grain size analysis, and calculated a groundwater seepage velocity of 0.7 ft/yr. Petroleum products (benzene, toluene, ethylbenzene, and xylene [BTEX] and total recoverable petroleum hydrocarbon [TRPH]) in groundwater were found primarily at monitoring well DH-1, in the excavation area (GSI 1991).

2.2.1.2 NDEQ LUST Investigation in 1992

In 1992, the LUST/ER Section of the NDEQ collected groundwater samples from four monitoring wells (DH-2 through DH-5) for analyses for BTEX, TRPH, and VOCs as part of the ongoing LUST investigations. The results indicated that no BTEX and TRPH were present above the detection limit in the monitoring wells. However, carbon tetrachloride was detected at all four monitoring wells (NDEQ 1992). The results for carbon tetrachloride and chloroform in these monitoring wells are in Table 2.2.

The distribution of carbon tetrachloride in the NDEQ 1992 investigation is shown in Figure 2.2. The highest concentration of carbon tetrachloride (383.6 µg/L) was found at well DH-5, on the northern edge of the Ag Valley Coop (formerly the Farmers Cooperative Association) grain storage facility (south of East Railroad Street). Lower concentrations were found at well DH-2 (50.3 µg/L) and well DH-4 (68.7 µg/L). Wells DH-2 and DH-4 are located along East Railroad Street, about 150 ft east of DH-5 and 100 ft west of DH-5, respectively. The lowest concentration (5.1 µg/L) was found at DH-3, in the northern part of the service station

(Figure 2.2). In addition, low levels of chloroform were detected at DH-5 (6.9 µg/L) and DH-4 (2.9 µg/L).

The NDEQ (1992) indicated that a potential source of contamination might exist in the area of the Bellamy Elevator grain storage facility (currently owned by the Ag Valley Coop), because "significant increases in the contamination levels of both analytes (carbon tetrachloride and chloroform) were noted in the monitoring well (DH-5) nearest to the facility." The representatives from the LUST/ER Section of the NDEQ expected that higher concentrations of carbon tetrachloride and chloroform would migrate to greater depths in the aquifer, potentially impacting downgradient municipal wells, and that the shallow LUST monitoring wells were unsuitable to address these contaminants (NDEQ 1992). Forwarding the report to the NDEQ's CERCLA Section for follow-up and continued investigation was recommended. However, no data and documents have been located indicating that any follow-up investigation has been conducted to date.

2.2.1.3 GSI LUST Investigation in 1995

In April 1995, at the request of the NDEQ, GSI collected groundwater samples from five monitoring wells (DH-1 through DH-5) for BTEX and TRPH analyses. BTEX and TRPH were detected only at well DH-1, indicating that the fuel contaminants are limited to the excavation area, with no measurable downgradient migration (GSI 1995).

All five monitoring wells (DH-1 through DH-5) were abandoned by GSI in 2006, as documented in a letter to the NDEQ (GSI 2006).

2.2.1.4 Interpretation of LUST Investigation Results: Possible Source of Carbon Tetrachloride Contamination

On the basis of the GSI (1991) hydrogeologic assessment for the LUST site, carbon tetrachloride contamination detected in groundwater from monitoring wells DH-2 through DH-5 indicates a local source south of the service station. This interpretation is based on the following observations:

- Carbon tetrachloride is present within the saturated losses unit, a leaky confining layer overlying the regional aquifer unit that provides groundwater to the public water supply wells.

- Lateral migration of carbon tetrachloride in the saturated losses unit is limited, because the hosting unit has low hydraulic conductivity (0.3 ft/day) and groundwater seepage velocity (0.7 ft/y) values.

- The leaky confining layer, because of its configuration and properties, is more likely to provide pathways for vertical migration than for lateral movement.

- The distribution of carbon tetrachloride suggests that the source of contamination is close to well DH-5, south of East Railroad Street and on the Ag Valley Coop grain storage facility.

- The limited extent of BTEX and TRPH identified in the series of sampling events in 1990-1995 confirmed that the lateral migration of contaminants in the losses unit was minimal.

2.2.2 E&E Pre-CERCLIS Site Screening Assessment for the EPA in 1996

At a request of the EPA (Region VII Site Assessment and Cost Recovery Branch), E&E investigated 31 sites in Nebraska to determine whether groundwater was impacted by grain fumigants associated with past operations at former CCC/USDA facilities (E&E 1996). The former Eustis facility was investigated under this program in 1996.

Prior to its field visit and groundwater sampling for the site screening assessment, E&E identified the former CCC/USDA facility at Eustis as a site with four large grain bins on the former Farmers Cooperative Association property. An attempt to confirm the presence of the former CCC/USDA facility at this location was unsuccessful. During the field visit, E&E identified four private wells immediately outside the Eustis village limits; the drinking water supply for all residents within the village is provided by the public water supply system. The depths of three of the private wells were reported as 175-250 ft; the depth of one well was unknown. E&E collected groundwater samples from the four private wells for VOCs analysis.

No VOCSs were found in any of these wells above the detection limits (E&E 1996). The locations of the four private wells sampled in 1996 (Betz, Brockmeier [now Bromander], Easterday, Hoselton) are shown in Figure 2.3. The results are summarized in Table 2.3.

2.2.3 Woodward Clyde Private Well Sampling for the CCC/USDA in 1997

In November 1997, Woodward Clyde conducted groundwater sampling for the CCC/USDA in private wells near the former CCC/USDA facility. Eight private wells were identified and sampled for VOCs analysis. No carbon tetrachloride or chloroform was present at any of these private wells above the detection limits (Woodward Clyde 1997). The eight water wells tested in 1997 included two of the wells sampled by E&E for the EPA in 1996 (Brockmeier/Bromander and Hoselton), as well as the Earhart, V. Hueftle, H. Koch/K. Koch, Laier, Roether/Ringenburg, and Strombaugh wells. All eight of the wells sampled in 1997 are located outside the Eustis village limits (Figure 2.3). All eight were resampled by Argonne for the CCC/USDA in 2012 (Section 2.2.5), though the ownership of some wells had changed. The results are in Table 2.3.

2.2.4 NDEQ Pre-CERCLIS Site Screening Assessment in March-July 2012

In July 2011, the NDHHS determined that groundwater from well PWS 70-1 had a running annual average concentration of carbon tetrachloride above the MCL, resulting in noncompliance of the public water supply system with state regulations. In response to the violation of state regulations at well PWS 70-1, the NDEQ started a “desktop” pre-CERCLIS site screening assessment in March 2012.

During this assessment, the NDEQ Remediation Section compiled all data and documents associated with the village public water supply wells, previous surveys, historical sampling events and investigations, and deeds and leasing information for the former CCC/USDA property. The NDEQ concluded that the source of the carbon tetrachloride and chloroform contamination detected in the public wells is unknown and that further site investigation is warranted (NDEQ 2012).

In its assessment, the NDEQ (2012) also confirmed the location of the former CCC/USDA grain storage facility in the southeastern part of Eustis and stated that the

contamination detected in the public water supply wells and the monitoring wells at the All Points Cooperative (formerly Farmland Service Coop) service station is hydraulically downgradient from the former CCC/USDA grain storage facility.

In May 2012, the NDEQ requested the CCC/USDA to conduct another sampling event for the private wells that had been sampled for the CCC/USDA by Woodward Clyde in 1997. The groundwater sampling for the identified private wells was performed in June 2012, as discussed below.

2.2.5 Argonne Private Well Sampling for the CCC/USDA in June 2012

In June 2012, Argonne, on behalf of the CCC/USDA, contacted the village and identified 13 private wells located immediately outside the village limits, within 1 mi of the former CCC/USDA facility. The locations of these private wells are shown in Figure 2.3. Some of the wells had been sampled by E&E for the EPA in 1996 (Section 2.2.2) and/or by Woodward Clyde for the CCC/USDA in 1997 (Section 2.2.3).

The groundwater samples collected from 13 private wells in 2012 were analyzed for VOCs. No carbon tetrachloride or chloroform was detected above the detection limits. The results are listed in Table 2.3 and illustrated in Figure 2.3.

2.3 Geologic and Hydrogeologic Setting

The area around Eustis lies within the Nebraska loess plain — originally a smooth, extensive, loess-mantled upland plain that was later dissected by Muddy, Deer, Medicine, and Plum Creeks and their tributaries (SCS 1974). Muddy, Deer, and Medicine Creeks drain to the Republican River to the south, while Plum Creek drains to the Platte River to the north (Figure 1.1). The surface topography in the area is typically characterized by flat-topped remnants of upland plain, separated by deep, steep-sided drainage tributaries (Figure 2.4).

The village of Eustis is located within the drainage valleys of Plum Creek, which drain initially to the east-southeast and ultimately to the Platte River to the north. The land surface elevations in the village of Eustis range from 2,600 ft to 2,660 ft above mean sea level (AMSL). The moderately dissected flat-topped upland plains (> 2,700 ft AMSL) border the drainage

valley to the north and south, resulting in local relief of 40-100 ft (Figure 2.4). The area is well drained, and surface runoff is rapid. Because the drainage valley does not cut into the major aquifer in the area (> 200 ft deep beneath the upland plains), Plum Creek in the vicinity of Eustis has intermittent flow and apparently receives no groundwater discharge. Thus, the groundwater flow pattern in the area is not controlled by local topographic variations or the presence of local stream networks.

2.3.1 Regional Geology and Hydrogeology

The subsurface geologic materials in Frontier County consist mainly of the following, in ascending order: (1) Niobrara Formation of late Cretaceous age, including chalk, limestone, and shale; (2) Ogallala Group of Tertiary age developed on the eroded Niobrara Formation surface, with poorly sorted coarse rock debris; and (3) a thick layer of Pleistocene loess mantling the entire area, with alluvial deposits in a few stream floodplains.

The basal Niobrara Formation consists of argillaceous chalk, limestone, and shale. The chalk is medium gray to white, interbedded with thin layers of chalky shale, while the limestone is light gray to medium gray and yellowish gray, interbedded with medium gray chalky shale. The active mountain building to the west marks the end of Cretaceous time. Periodic uplifting resulted in periods of erosion, deposition, and stability during the Tertiary.

The Ogallala Group (Pliocene epoch) above the Niobrara Formation typically forms major deposits (broad fans of rock debris) derived from the western mountains that encroached on the area during a fairly long period of erosion and valley formation across Nebraska. The Ogallala Group is composed of inter-fingered, fine- to coarse-grained, poorly sorted, arkosic, fluvial deposits of light gray, light olive-gray, and grayish green, calcareous silt and sand. These deposits are locally poorly consolidated conglomerate, sandstone, and siltstone. Because individual beds are generally not extensive, correlations from place to place cannot be predicted on the basis of lithology (Johnson 1960).

Overlying the Ogallala Formation are Pleistocene and recent deposits, which mainly consist of loess that mantles most of the area. Loess deposits can be further subdivided as the Loveland Formation and the Peorian loess in Nebraska, correlating with glaciation stages (Johnson 1960). The Loveland Formation, of eolian origin, consists of reddish brown calcareous

silt with minor amounts of sand and clay and covers both the drainageways and low divides. The overlying light brown to nearly white Peorian loess contains nodular calcareous concretions and mantles most of the area. Some alluvial deposits are found along a few drainage valleys, such as the floodplains along Medicine Creek in western Frontier County.

The Ogallala Group and the overlying Quaternary alluvial deposits (mainly in the valleys) constitute a major aquifer in the area. The aquifer is confined by the underlying Niobrara chalk and shaly limestone and overlain by a thick loess mantle (Pleistocene). The thickness of the aquifer may exceed 500 ft in the area. The regional groundwater levels in the aquifer indicate a groundwater divide oriented in the northwest-southeast direction near the Eustis area. Groundwater flows to the north or northeast, toward the Platte River, as well as to the south or southeast, to the Republican River. Because the topographic and groundwater divides do not coincide, groundwater in northeastern Frontier County and northern Gosper County flows to the Republican River to the south, whereas surface runoff in the same area moves toward the Platte River to the north.

Chemically, groundwater from the major aquifer in the area is of the calcium bicarbonate type. The hardness of the groundwater is about 300 mg/L (classified as very hard).

2.3.2 Local Geology and Hydrogeology

Geologic and hydrogeologic information for the local Eustis area was obtained from state test hole records and water well registration records. In the vicinity of Eustis, two test holes were identified: 22-H-78 and 54-A-48 (Figure 2.4). Test hole 22-H-78, 3.5 mi northwest of Eustis, has a total depth of 680 ft and penetrates the entire Ogallala Group to the top of Niobrara Formation, at the base of the regional aquifer. Test hole 54-A-48 is about 2.5 mi east of Eustis and has a shallower depth of 485.7 ft BGL, penetrating to the middle of the Ogallala Group.

Within 1 mi of wells PWS 70-1 and PWS 91-1, records for 19 wells were found, including 5 irrigation wells, 5 abandoned monitoring wells, 4 domestic wells, 3 livestock wells, and 2 heat pump/exchange wells. The locations of these wells are shown in Figure 2.4. The depths of the private water wells range from 205 ft to 360 ft BGL, reaching the upper part of the regional major aquifer (Ogallala Group). The five LUST monitoring wells were much shallower than the groundwater production wells, with depths of 113 ft BGL (within the loess unit). Two

heat pump/exchange wells also penetrate to shallow depths of 180-200 ft BGL, near the top of Ogallala aquifer.

To illustrate the configuration of local geologic and hydrogeologic units, two geologic cross sections were constructed by using geologic logs from the two test holes and lithologic descriptions of selected private water wells and monitoring wells within 1 mi of the public water supply wells. In addition, a few private water wells between the test holes and within 1 mi of the public wells were used to fill gaps in the cross sections. Locations of all test holes and wells used to construct the cross sections are shown in Figures 2.4 and 2.5. Individual logs are in Appendix B.

Cross section A-A' (Figure 2.6) extends for approximately 6.5 mi from west to east, connecting test holes, local private water wells, and the Eustis public water supply wells (Figure 2.4). North-south cross section B-B' (Figure 2.7) illustrates details of local geology along a line from a local water well at the northern edge of Eustis to a well about 1 mi south of the village (Figure 2.5).

The interpretations presented in cross sections A-A' and B-B' indicate three local geologic units in descending order: (1) an undifferentiated Quaternary eolian loess unit (silt and clay), with a thickness of 150-260 ft; (2) the Ogallala Group (silt, sand, and sandstone), with increasing thickness toward the upland (450 ft at test hole 22-H-78); and (3) the Niobrara Formation chalk (Figures 2.6 and 2.7). The local major aquifer consists primarily of the Ogallala Group and contains alternating beds of silt, sand, sand and gravel, and sandstone. Within the aquifer, beds of coarse-grained deposits (e.g., sand and gravel) are permeable intervals that are often targeted for placement of well screens to extract water. The heterogeneity within the Ogallala Group indicates that the permeable beds change in short distances, so that no apparent lateral correlations can be used for predictions from one well to another. The aquifer is confined by the overlying Quaternary loess unit at the top and the underlying Niobrara chalk at the bottom. Water levels measured at all wells are above the top of the aquifer, confirming that the aquifer is under confined conditions.

In developing the WHPA for the Eustis public water supply system, the NDEQ WHP Program collected water level data from 55 water wells in the vicinity of Eustis and determined a general groundwater flow direction to the south-southwest in the Ogallala aquifer. More detailed

measurements are needed to identify the groundwater flow patterns near the former CCC/USDA facility and well PWS 70-1, with and without stress from pumping wells in the area.

The 1991 GSI investigation for the service station LUST site at the All Points Cooperative (formerly Farmland Service Coop) property characterized the loess unit to a depth of 113 ft (monitoring well DH-5). The results of grain size analysis suggested a low hydraulic conductivity of 0.3 ft/day. The loess unit apparently serves as a leaky confining layer for the underlying Ogallala aquifer. The lateral groundwater movement within the saturated loess unit is estimated to be very small (0.7 ft/yr) (GSI 1991). However, the loess unit may provide vertical migration pathways allowing water to move downward into the underlying Ogallala aquifer.

2.4 Identification of Potential Contaminant Source Areas

Carbon tetrachloride contamination previously found in soil and groundwater in a number of rural communities in Nebraska has been determined to be related to grain storage operations at former CCC/USDA and commercial/private grain storage facilities that were active during the 1950s to 1970s. On the basis of results for public water supply well sampling and previous investigations (Section 2.3), carbon tetrachloride contamination has been identified in groundwater at three locations at Eustis, as follows:

1. Carbon tetrachloride contamination in the Ogallala aquifer groundwater at well PWS 70-1, at a running annual average concentration of 5.24 µg/L (> MCL), as calculated by the NDHHS in 2011.

2. Carbon tetrachloride contamination occasionally detected below or near the MCL in the Ogallala aquifer groundwater at well PWS 91-1.

3. High concentrations of carbon tetrachloride contamination in groundwater (up to 383.6 µg/L) in the saturated loess unit, a leaky confining layer overlying the Ogallala aquifer near the service station that was the site of LUST investigations in 1990-1995.

To identify potential source areas that likely contribute to groundwater contamination at these three locations, Argonne conducted a property document search, collected community

information, and analyzed historical aerial photographs. This section presents the results of the combined analyses of all documentation available to the public.

Through a review of historical aerial photographs taken in 1958, 1965, and 2010 and local community information, two types of grain storage facilities were identified at Eustis. These are (1) the former CCC/USDA grain storage facility near the southeastern edge of Eustis and (2) multiple private grain storage facilities along the railroad right-of-way, west of the former CCC/USDA facility.

The historical ownership of the former CCC/USDA grain storage property was determined on the basis of documents acquired from the Frontier County Courthouse in Stockville, Nebraska. A summary of these historical ownership and property records is in Appendix C, Table C.1. The available property records are also reproduced in Appendix C.

Information on historical ownership of private grain storage properties on the railroad right-of-way was not available at the courthouse but was obtained from a village centennial history publication (Village of Eustis 1986).

2.4.1 Former CCC/USDA Grain Storage Facility

The former CCC/USDA facility was located north of the railroad right-of-way along East Railroad Street, at the southeastern edge of the village. A two-acre parcel on the southeastern corner of an eight-acre property was leased to the CCC/USDA by F.W. Volkman in June 1950 for five years. The lease was renewed three times, with five-year lease terms, in September 1954, September 1959, and March 1964. In October 1964, the lease was terminated, and the property was released back to Fred and Grace Volkman (Appendix C). Historical aerial photographs show grain storage activities on the former CCC/USDA facility that are consistent with the lease terms. The 1958 aerial photograph shows 2 Quonsets and 1 storage building (north of the Quonsets) on the eastern part of the leased property and 10 circular bins, 20 ft in diameter, on the western part (Figure 2.8). By 1965, all traces of the circular bins and the storage building had been removed from the former CCC/USDA facility, but the 2 original Quonsets remained on the property (Figure 2.9).

The capacity of the grain storage structures on the former CCC/USDA facility is estimated as follows: (1) 80,000 bushels for the 2 Quonsets (40 ft by 100 ft; 40,000 bushels each) and (2) 32,500 bushels for the 10 bins (20 ft in diameter; 3,250 bushels each). The estimated total capacity for grain storage at the former CCC/USDA facility is therefore 112,500 bushels if fully utilized. Detailed data on total yearly usage are unavailable.

The Volkman property that was leased to the CCC/USDA in 1950-1964 was subsequently conveyed through several owners (Grabenstein, Johnson [owner of Hi-Line Implement], Hi-Line Implement [John Deere dealership], and Schurr) to Eustis Ag and Auto, Inc., in 1993. In 2006, the property was conveyed to the current owner, A&T Repairs, Inc. (Appendix C).

On the basis of the groundwater flow direction in the Ogallala aquifer, as determined by the NDEQ WHP Program, the potential of the former CCC/USDA facility to be a source area for the three currently identified locations of groundwater contamination (Section 2.4) is as follows:

1. *Medium potential to be a source area for contamination at well PWS 70-1*. The former CCC/USDA facility is located in a general area that is hydraulically upgradient from the groundwater contamination identified in the Ogallala aquifer at well PWS 70-1. However, the former facility is not directly within the capture zone of pumping at well PWS 70-1, as predicted by the NDEQ WHP Program (Appendix A).

2. *Low potential to be a source area for contamination at well PWS 91-1*. The former CCC/USDA facility is not located in a general area that is hydraulically upgradient from the groundwater contamination identified in the Ogallala aquifer at well PWS 91-1 under ambient groundwater conditions. The radius of influence of pumping at well PWS 91-1 would not be expected to extend 3,500 ft southeast to the former CCC/USDA facility.

3. *Low potential to be a source area for contamination at the LUST monitoring wells*. Groundwater contamination identified in the loess unit near the LUST investigation site is 800 ft away from the former CCC/USDA facility, and lateral contaminant migration in the low-permeability loess unit is expected to be extremely slow (0.7 ft/yr; Section 2.2.1.4).

2.4.2 Private Grain Storage Facilities

Private grain storage facilities are located primarily on the railroad right-of-way. These facilities, developed over several decades, were operated by businesses including Bellamy Elevator, Inc., Farmers Cooperative Association, Morrison-Gregg-Mitchell Elevator, Gengenbach Elevator, and the Ag Valley Coop.

The 1958 aerial photograph (Figure 2.8) shows that Bellamy Elevator operated a facility on the right-of-way east of Main Street, including 3 flat storage buildings (200,000 bushels each), 20 storage bins (20 ft in diameter) surrounding the flat storage buildings, and 10 storage bins on the north side of the right-of-way. The estimated grain storage capacity at the Bellamy Elevator was about 700,000 bushels. At the same time, the Farmers Cooperative Association operated 1 flat storage building (200,000 bushels) on the railroad right-of-way, west of Main Street (Village of Eustis 1986). The Morrison-Gregg-Mitchell Elevator managed a small grain storage facility, including 2 bins (25 ft in diameter) and a wooden elevator, northeast of the Bellamy Elevator facility on the railroad right-of-way. The combined private grain storage capacity in 1958 approached 1 million bushels.

The 1965 aerial photo (Figure 2.9) indicates that the Farmers Cooperative Association had added a new office and a new concrete elevator (250,000 bushels) north of its flat storage building (west of Main Street). These structures were built in 1961 and 1963, respectively (Village of Eustis 1986). On the Bellamy Elevator facility, 7 bins (20 ft in diameter) had been added east of the easternmost flat storage building. The 7 bins could have been moved from the former CCC/USDA facility after termination of that operation in 1964. The combined private grain storage capacity in 1965 was more than 1.2 million bushels.

In 1978, the Farmers Cooperative Association built a grain-handling facility with 4 large metal bins (315,000 bushels). In 1980-1985, the Gengenbach Elevator purchased and operated the former Morrison-Gregg-Mitchell Elevator facility (Village of Eustis 1986). In the 1990s-2000s, most of the private grain storage facilities were owned by the Farmers Cooperative Association (red outlines in Figure 2.10). The exceptions are (1) the easternmost flat storage building owned by Bellamy Elevator at the time of the 1990-1995 LUST investigations and currently owned by All Points Cooperative (blue outlines in Figure 2.10) and (2) the former Gengenbach Elevator facility, now owned by Rick Dunbar (green outlines in Figure 2.10). On April 1, 2013, the Farmers Cooperative Association merged with the Ag Valley Coop.

As shown in Figures 2.8, 2.9, and 2.10, all major historical private grain storage activities in Eustis were conducted on the railroad right-of-way. A review of deed records obtained at the Frontier County Courthouse determined that the railroad and its right-of-way at Eustis were owned by the Chicago, Burlington, and Quincy Railroad Company in 1909. In 1996, the railroad property was conveyed through the Burlington Northern Railroad Company to a third entity, Nebraska, Kansas, and Colorado Railnet, Inc.

On the basis of the groundwater flow direction in the Ogallala aquifer determined by the NDEQ WHP Program and the locations of the various facilities, the potential of the private grain storage facilities to be source areas for the three locations of groundwater contamination (Section 2.4) is as follows:

1. *High potential to be source areas for contamination at well PWS 70-1*. All private grain storage facilities are located in a general area that is hydraulically upgradient from the groundwater contamination identified in the Ogallala aquifer at well PWS 70-1. Parts of some of the private grain storage facilities lie directly within the capture zone of pumping at well PWS 70-1, as predicted by the NDEQ WHP Program (Appendix A).

2. *Low potential to be source areas for contamination at well PWS 91-1*. The private grain storage facilities are not located in a general area that is hydraulically upgradient from the groundwater contamination in the Ogallala aquifer at well PWS 91-1 under ambient groundwater conditions. The radius of influence of pumping at well PWS 91-1 would be unlikely to extend 2,200 ft south-southeast to these facilities.

3. *High potential to be a source area for contamination at the LUST monitoring wells*. The highest groundwater contamination (383.6 µg/L) in the loess unit at well DH-5 was found on the northern part of the former Bellamy Elevator grain storage facility, where 10 grain bins and 1 elevator were located in 1958 and subsequently (Figures 2.8 and 2.9)

2.5 Summary

The main findings from this review and evaluation of background information, results of previous investigations, and historical documents are summarized as follows:

- Groundwater contamination associated with grain fumigation at Eustis was identified at three locations: well PWS 70-1, well PWS 91-1, and the LUST monitoring wells. Characteristics of the identified contamination are as follows:

  - *Well PWS 70-1*. Carbon tetrachloride was detected (0.47-6.87 µg/L) in groundwater from the Ogallala aquifer (screen intervals at 194-204 ft BGL and 284-304 ft BGL). In 2011, the running annual average concentration of carbon tetrachloride reached 5.24 µg/L, exceeding the MCL. Historical data (2008-2012) show an inverse correlation between carbon tetrachloride concentration and monthly pumping volume.

  - *Well PWS 91-1*. Carbon tetrachloride was occasionally (6 of 15 sampling events) detected at low levels in groundwater from the Ogallala aquifer (screen intervals at 270-280 ft BGL and 350-380 ft BGL). To date, the running annual average concentration has been below the MCL.

  - *Monitoring wells DH-2 through DH-5*. In 1992, carbon tetrachloride was detected (5.1-383.6 µg/L) in groundwater from the saturated loess unit (screen interval at 98-113 ft BGL) overlying the Ogallala aquifer. The distribution of concentrations suggests that the potential source of contamination is close to well DH-5, south of East Railroad Street and on the northern part of the former Bellamy Elevator grain storage facility (presently the Ag Valley Coop. grain storage facility).

- Carbon tetrachloride and chloroform were not detected in any private water wells in the vicinity of Eustis, including 4 wells tested by E & E for the EPA in March 1996, 8 wells sampled by Woodward Clyde for the CCC/USDA in November 1997, and 13 wells tested by Argonne for the CCC/USDA in June 2012.

- The local geologic sequence, in descending order, consists of (1) an undifferentiated loess unit (silt and clay) with a thickness of 150-260 ft; (2) the Ogallala Group (alternating beds of silt, sand, sand and gravel, and sandstone) with increasing thickness (up to 450 ft) toward the upland; and (3) the Niobrara chalk and limestone.

- Locally, the principal water-producing unit is the Ogallala aquifer, which is confined by the overlying Quaternary loess unit and the basal Niobrara chalk. The NDEQ WHP Program suggests, on the basis of regional information, that the Ogallala aquifer exhibits a hydraulic conductivity of 54 ft/day and that groundwater flows south-southwest.

- The loess unit, a leaky confining layer overlying the Ogallala aquifer, might be saturated near its lower or bottom part (~ 100 ft). The saturated loess unit has low hydraulic conductivity (0.3 ft/day), and lateral groundwater movement within the unit is about 0.7 ft/year, as measured at the LUST site.

- Well PWS 70-1 was removed from general service and was placed on backup/standby status for emergency use only in January 2012. The village of Eustis is currently using only well PWS 91-1 for its public water supply system and recently conducted a test at a potential new public well location approximately 2,000 ft northwest of PWS 91-1, near the northwestern edge of the village.

- Sources of elevated carbon tetrachloride contamination at well PWS 70-1 and monitoring wells are possibly associated with the nearby historical grain storage operations. Sources of the carbon tetrachloride detected occasionally at well PWS 91-1 are unknown. The known historical grain storage operations were located more than 2,000 ft from well PWS 91-1, outside the upgradient part of the PWS 91-1 WHPA, as defined by the NDEQ WHP Program.

- Two types of grain storage facilities are identified as potential source areas of groundwater contamination associated with historical grain fumigation, as follows:

- The former CCC/USDA grain storage facility, located north of the railroad right-of-way along East Railroad Street, at the southeastern edge of the village. In 1950-1964, this facility operated 2 Quonsets and 10 bins (20 ft in diameter), with an estimated storage capacity of 112,500 bushels. This facility is located in a general area that is hydraulically upgradient from the groundwater contamination in the Ogallala aquifer identified at well PWS 70-1, even though it is not directly within the capture zone of pumping at well PWS 70-1, as predicted by the NDEQ WHP Program (Appendix A). There is little potential for the CCC/USDA facility to be a source for the contamination in the saturated loess unit at the LUST monitoring wells.

- Various historical private grain storage facilities, located mainly on the railroad right-of-way and owned by companies including the Bellamy Elevator, the Farmers Cooperative Association, the Morrison-Gregg-Mitchell Elevator, and the Gengenbach Elevator. The combined private grain storage capacity approached 1 million bushels in 1958 and exceeded 1.2 million bushels in 1965. Parts of some of these private facilities are located within the capture zone of pumping at well PWS 70-1, as predicted by the NDEQ WHP Program. The northern part of the former Bellamy Elevator (now the Ag Valley Coop) is near the LUST site and is a possible source contributing to contamination in the saturated loess unit at well DH-5.

TABLE 2.1 Analytical results for groundwater samples collected from public water supply wells in 1990-2012.

				Concentration (µg/L)	
Well	Sampling Date and Time		Sample	Carbon Tetrachloride	Chloroform
70-1	6/1/99		P8067-78	0.47	ND (0.4)
70-1	6/17/02		P20240-67	ND (0.5)	ND (0.5)
70-1	5/9/05		P27460-64	ND (0.5)	ND (0.5)
70-1	5/5/08		P33983-63	3.5	ND (0.5)
70-1	5/19/08		P34246-42	2.3	ND (0.5)
70-1	7/7/08		P34392-6	1.8	ND (0.5)
70-1	10/6/08		P35283-6	1.17	ND (0.5)
70-1	1/12/09		P35776-6	4.11	ND (0.5)
70-1	4/7/09		P36163-6	ND (0.5)	ND (0.5)
70-1	7/6/09		P36610-4	ND (0.5)	ND (0.5)
70-1	10/5/09		P37343-6	0.95	ND (0.5)
70-1	1/4/10	14:10	P37875-6	3.88	0.59
70-1	4/19/10	13:25	12073	1.93	ND (0.5)
70-1	7/6/10	13:30	31379	2.01	ND (0.5)
70-1	10/4/10	14:35	54298	3.02	ND (0.5)
70-1	1/11/11	14:30	68052	4.55	0.58
70-1	5/23/11	14:30	85780	5.51	0.6
70-1	6/9/11	13:35	112659	6.87	0.6
70-1	7/11/11	14:55	116630	4.01	0.621
70-1	10/3/11	14:10	133949	2.62	ND (0.5)
70-1	1/9/12	13:15	151768	6.87	1.46
91-1	3/19/01		P17779-12	0.46	0.56
91-1	2/24/04		P24830-14	ND (0.5)	ND (0.5)
91-1	5/14/07		P31814-15	ND (0.5)	ND (0.5)
91-1	5/10/10	14:00	12075	4.65	0.69
91-1	5/26/10	15:30	27741	ND (0.5)	ND (0.5)
91-1	9/20/10	13:30	51396	3.32	ND (0.5)
91-1	10/4/10	14:10	54299	ND (0.5)	ND (0.5)
91-1	1/11/11	14:10	68051	4.28	0.59
91-1	5/23/11	8:30	85779	ND (0.5)	ND (0.5)
91-1	7/11/11	15:15	116629	0.59	ND (0.5)
91-1	10/3/11	13:15	133948	ND (0.5)	ND (0.5)
91-1	1/9/12	13:45	151767	5.34	0.51
91-1	1/30/12	15:10	158151	ND (0.5)	ND (0.5)
91-1	4/2/12	13:45	166166	ND (0.5)	ND (0.5)
91-1	7/9/12	13:18	184528	ND (0.5)	ND (0.5)
Point of Entry	8/22/90		1030V	ND (0.4)	ND (0.1)
Point of Entry	8/22/90		1031V	ND (0.4)	ND (0.1)
Point of Entry	4/20/93		6454V	ND (0.4)	ND (0.1)
Point of Entry	4/20/93		6455V	ND (0.4)	ND (0.1)
Point of Entry	7/13/94		268VA	ND (0.4)	0.7
Point of Entry	3/7/95		9375V	ND (0.4)	ND (0.1)
Point of Entry	2/5/97		15791349	ND (0.4)	ND (0.1)
Point of Entry	8/18/98		P20405-2	ND (0.4)	ND (0.1)

Source of data: NDEQ public water supply database online (http://sdwis-dhhs.ne.gov:8000/DWW/index.jsp, Water System No. NE3106301).

TABLE 2.2 Analytical results from the previous investigation at the LUST site near the private grain storage facilities along the railroad right-of-way.

				Concentration (μg/L)		
Location	Sample	Sample Date	Sample Depth[a] (ft BGL)	Carbon Tetrachloride	Chloroform	Methylene Chloride
DH-2	CE92-10-1	10/13/92	104-113	50.3	3	2.3 U[b]
DH-3	CE92-10-6	10/13/92	105-113	5.1	1.8 U	2.3 U
DH-4	CE92-10-5	10/13/92	105-113	68.7	2.9	2.3 U
DH-5	CE92-10-3	10/13/92	104-113	322.2	7.6	2.3 U
DH-5	CE92-10-4	10/13/92	104-113	383.6	6.9	2.3 U

[a] The sample depth is estimated on the basis of the interval between the water level in the well and the bottom of the well screen. The water level is below the top of screen, which is at about 98 ft BGL.

[b] Qualifier U indicates that the constituent was not detected at the specified detection limit.

Source of data: NDEQ (1992).

TABLE 2.3 Analytical results for groundwater samples collected from private wells.

Location	Sample	Sample Date	Sample Depth[a] (ft BGL)	Concentration (μg/L) Carbon Tetrachloride	Chloroform	Methylene Chloride
Private well sampling in March 1996 by E&E[b]						
Betz	CU107-016	3/6/1996	Unknown	ND[c]	ND	ND
Brockmeier[d]	CU107-018	3/6/1996	Unknown	ND	ND	ND
Easterday	CU107-017	3/6/1996	Unknown	ND	ND	ND
Hoselton	CU107-015	3/5/1996	Unknown	ND	ND	ND
Private well sampling in November 1997 by Woodward Clyde[e]						
Brockmeier[d]	ESDW05	11/12/1997	Unknown	ND	ND	–
Earhart	ESDW06	11/12/1997	Unknown	ND	ND	–
Hoselton	ESDW04	11/12/1997	Unknown	ND	ND	–
V. Hueftle	ESDW03	11/12/1997	Unknown	ND	ND	–
H. Koch[f]	ESDW02	11/12/1997	Unknown	ND	ND	ND
Laier	ESDW07	11/12/1997	Unknown	ND	ND	ND
Roether[g]	ESDW01	11/12/1997	Unknown	ND	ND	ND
Strombaugh	ESDW08	11/12/1997	Unknown	ND	ND	ND
Private well sampling in July 2012 by Argonne[h]						
Betz	ESBetz-W-34082	7/2/2012	Unknown	ND	ND	ND
Bromander	ESBromander-W-34075	7/2/2012	Unknown	ND	ND	ND
Deterding	ESDetering-W-34073	7/2/2012	Unknown	ND	ND	ND
Earhart	ESEarhart-W-34074	7/2/2012	Unknown	ND	ND	ND
Easterday	ESEasterday-W-34079	7/2/2012	Unknown	ND	ND	ND
Hoselton	ESHoselton-W-34072	7/2/2012	Unknown	ND	ND	ND
K. Hueftle	ESKHueftle-W-34080	7/2/2012	Unknown	ND	ND	ND
K. Koch	ESKoch-W-34078	7/2/2012	Unknown	ND	ND	ND
Laier	ESLaier-W-34083	7/2/2012	Unknown	ND	ND	ND
Ringenburg	ESRingenburg-W-34077	7/2/2012	Unknown	ND	ND	ND
Schmeeckle	ESSchmeeckle-W-34076	7/2/2012	Unknown	ND	ND	ND
Strombaugh	ESStrombaugh-W-34081	7/2/2012	Unknown	ND	ND	ND
V. Hueftle	ESVHueftle-W-34084	7/2/2012	Unknown	ND	ND	ND

See next page for footnotes.

TABLE 2.3 (Cont.)

[a] The sample depth is estimated on the basis of the well's screen interval.

[b] Analytical results for this sampling event are based on detection limits of 0.2 μg/L, 0.4 μg/L, and 1.0 μg/L for carbon tetrachloride, chloroform, and methylene chloride, respectively.

[c] ND, not detected at the detection limits specified for the respective investigation (notes b, e, and h).

[d] The property has been owned by Bromander since 2004.

[e] Analytical results for this sampling event are based on detection limits of 0.5 μg/L for carbon tetrachloride and chloroform and 1.0 μg/L methylene chloride.

[f] The property has been owned by K. Koch since 2006.

[g] The property has been owned by Ringenburg since 2010.

[h] Analytical results for this sampling event are based on a detection limit of 0.1 μg/L for carbon tetrachloride, chloroform, and methylene chloride.

Sources of 1996 and 1997 data: E&E (1996) and Woodward Clyde (1997).

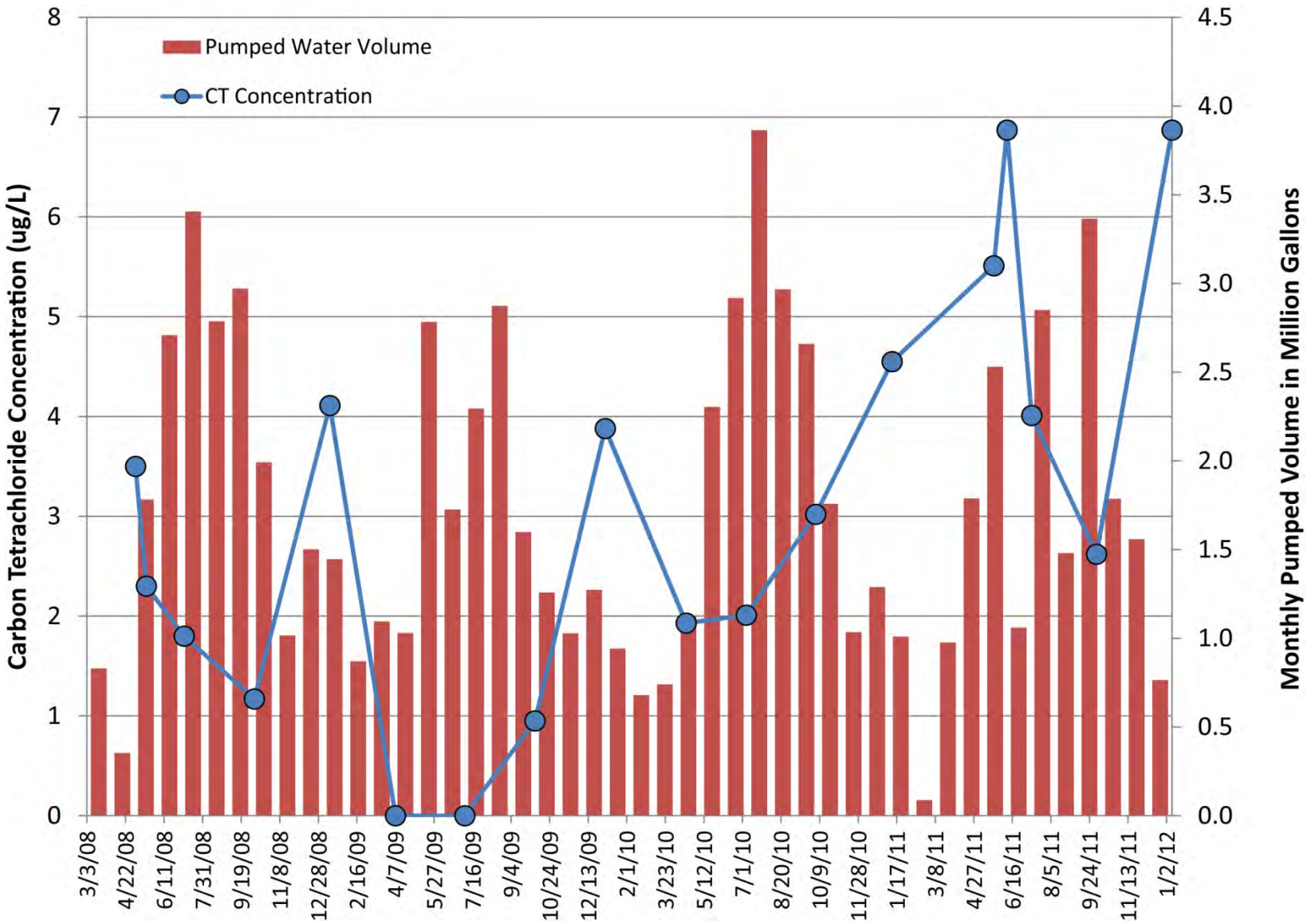

FIGURE 2.1 Concentrations of carbon tetrachloride in groundwater collected from well PWS 70-1 and monthly pumping volumes for this well in 2008-2012.

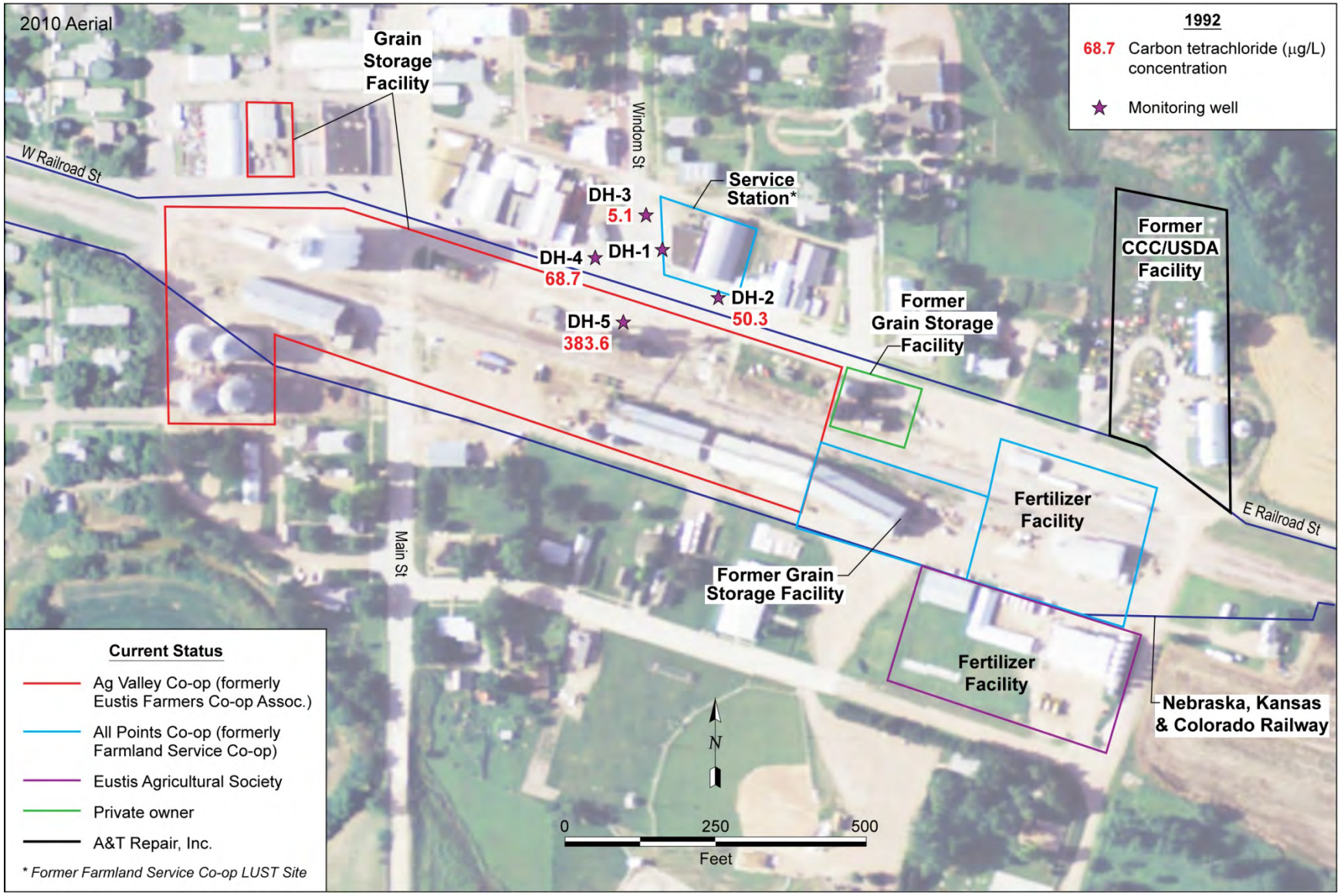

FIGURE 2.2 Concentrations of carbon tetrachloride in groundwater samples collected by the NDEQ in 1992 at a service station LUST site near the Ag Valley Coop (formerly the Farmers Cooperative Association) grain storage facility. Source of photograph: USDA (2010).

FIGURE 2.3 Historical carbon tetrachloride concentrations in groundwater samples collected from private wells by E&E for the EPA in March 1996, by Woodward Clyde for the CCC/USDA in November 1997, and by Argonne for the CCC/USDA in July 2012. Source of photograph: USDA (2010).

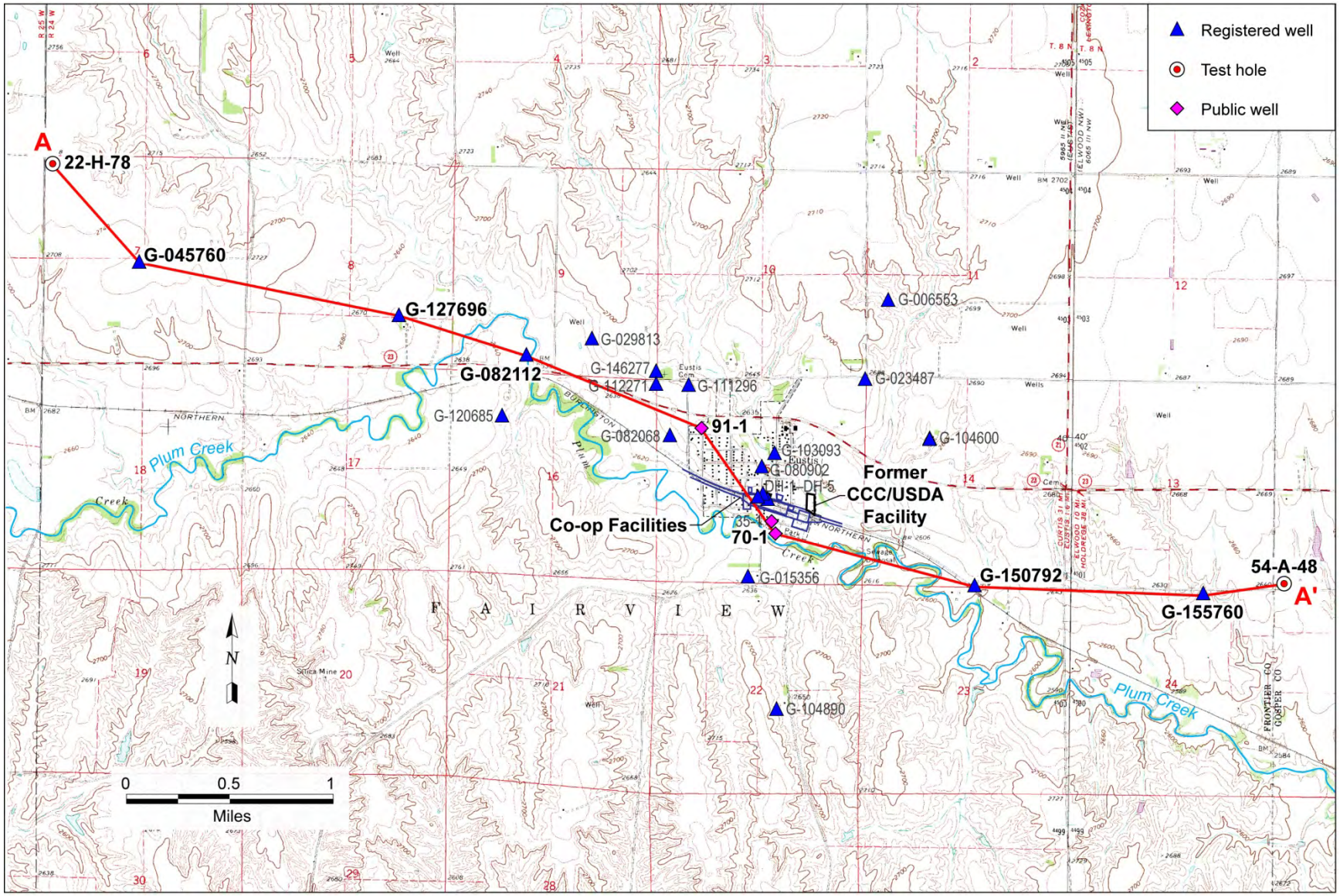

FIGURE 2.4 Locations of water wells within 1 mi of the former CCC/USDA facility that have been registered with the state and nearby state geologic test holes, with the location of geologic cross section A-A'. Source of 1982 topographic map: USGS (1997).

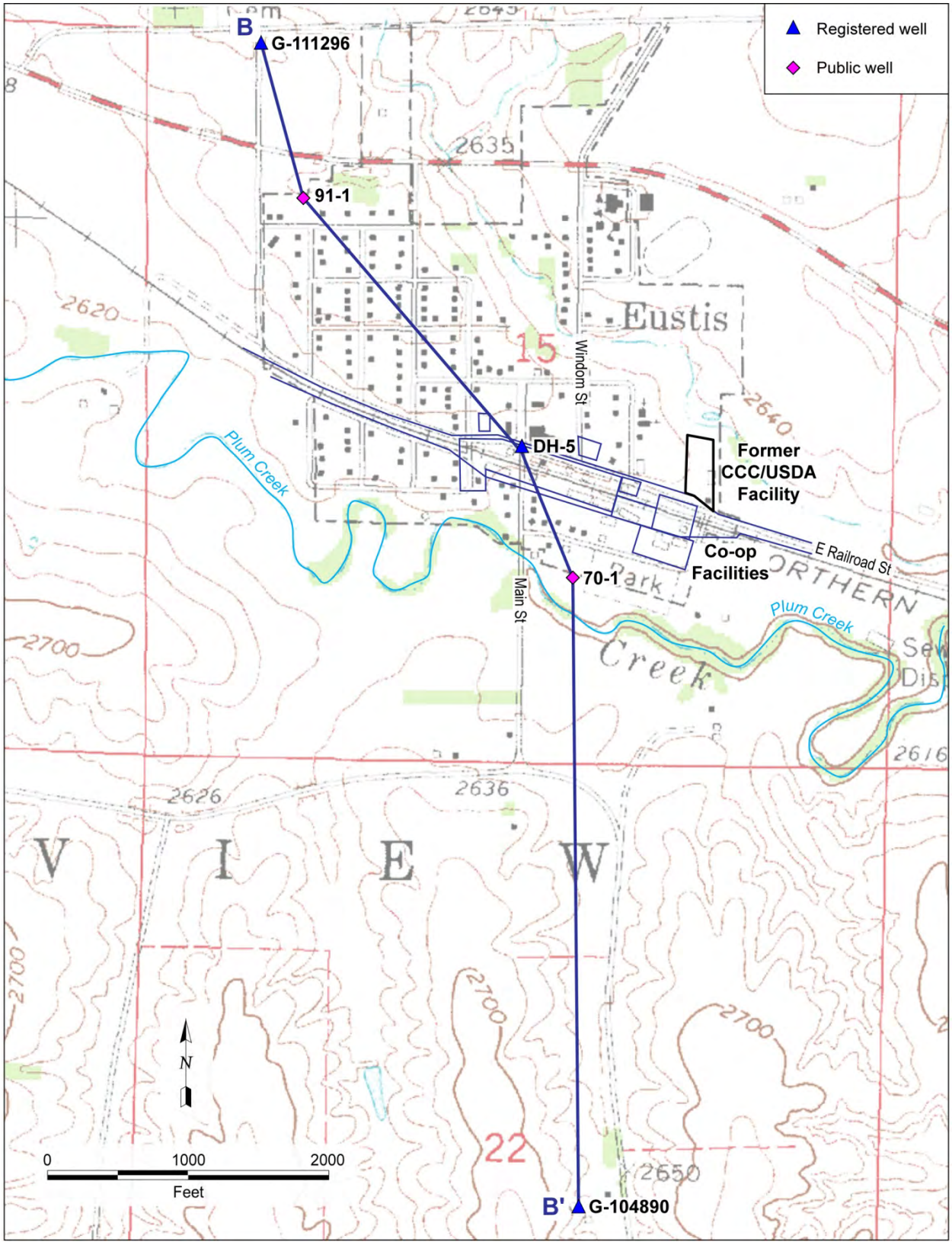

FIGURE 2.5 Locations of geologic cross section B-B' and the water wells used for its construction. Source of 1982 topographic map: USGS (1997).

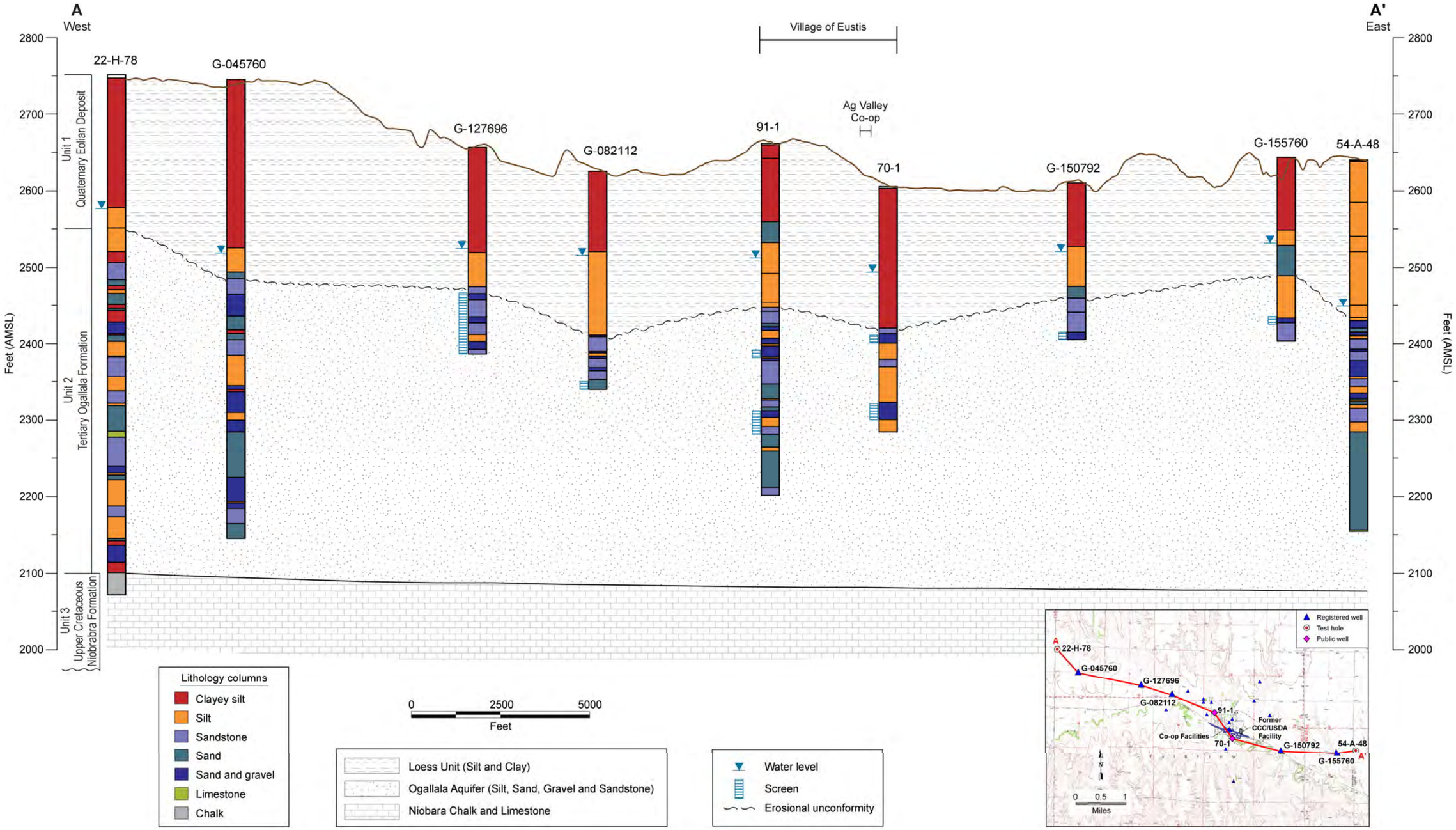

FIGURE 2.6 West-to-east hydrogeologic cross section A A' (vertically exaggerated), illustrating stratigraphic relationships and water levels.

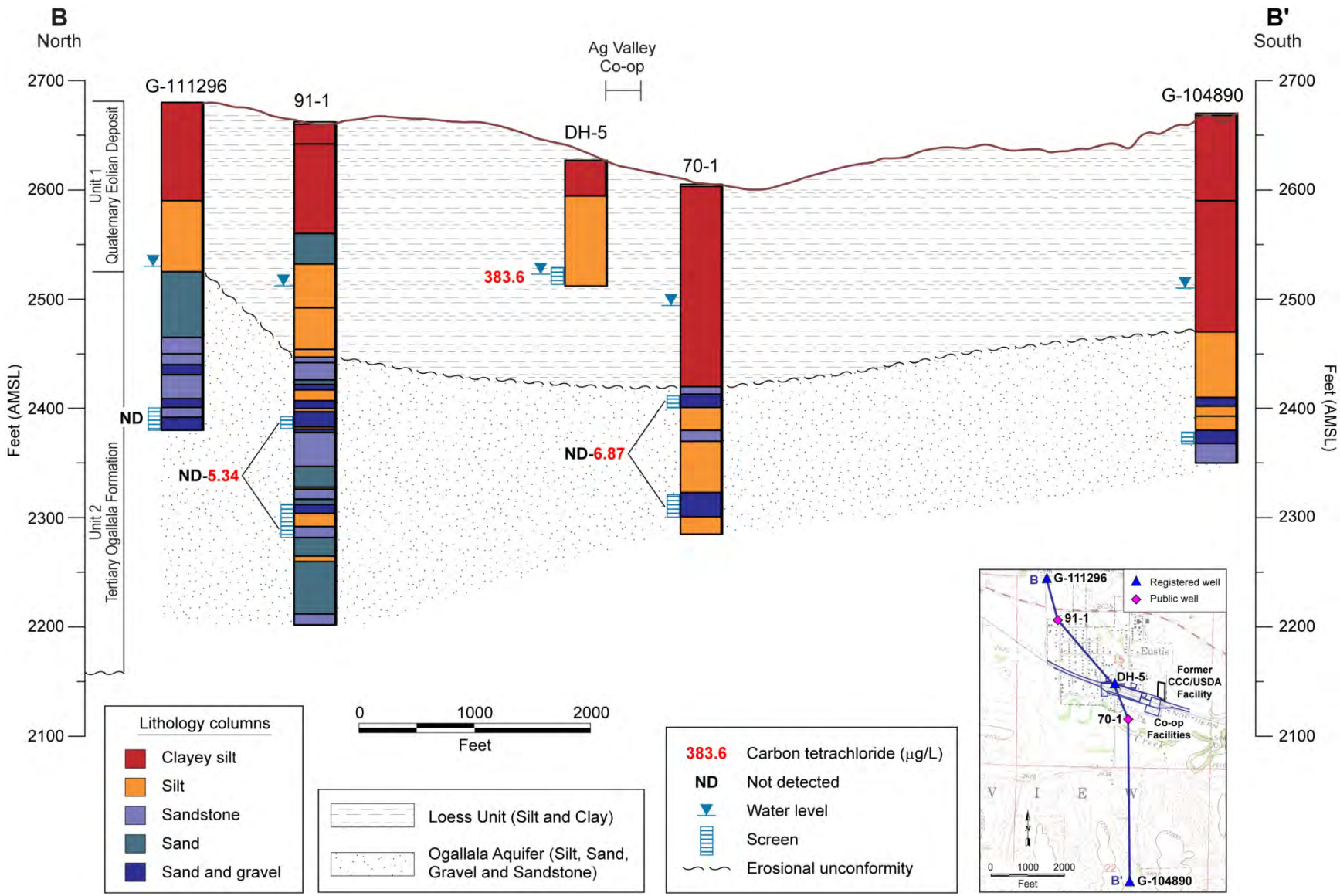

FIGURE 2.7 North-to-south geologic cross section B-B' (vertically exaggerated), illustrating stratigraphic relationships and water levels.

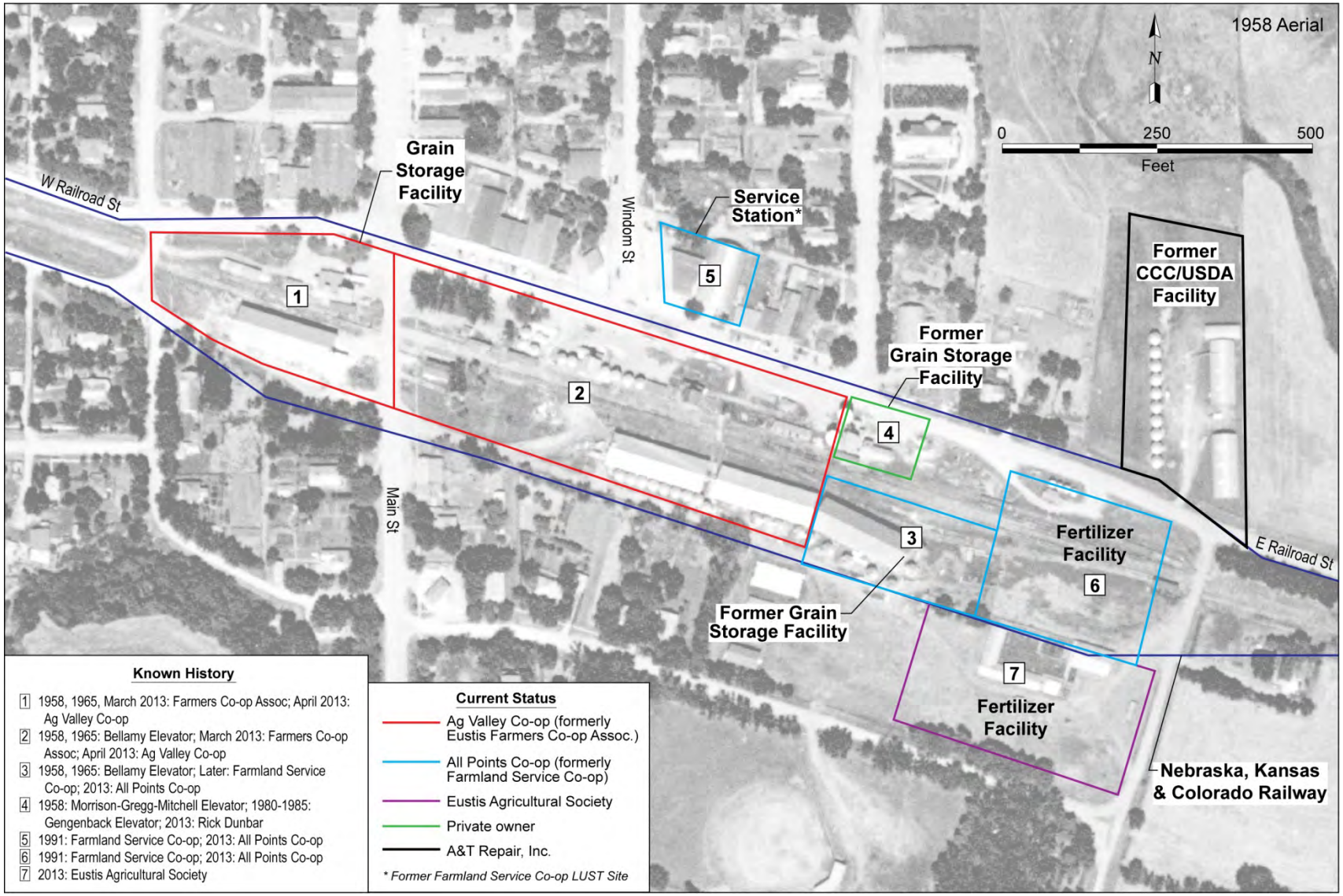

FIGURE 2.8 Locations of the former CCC/USDA grain storage facility near the southeast edge of Eustis and private grain storage facilities near and along the railroad right-of-way, as interpreted from a 1958 aerial photograph, property records, and local community information. Source of photograph: USDA (1958).

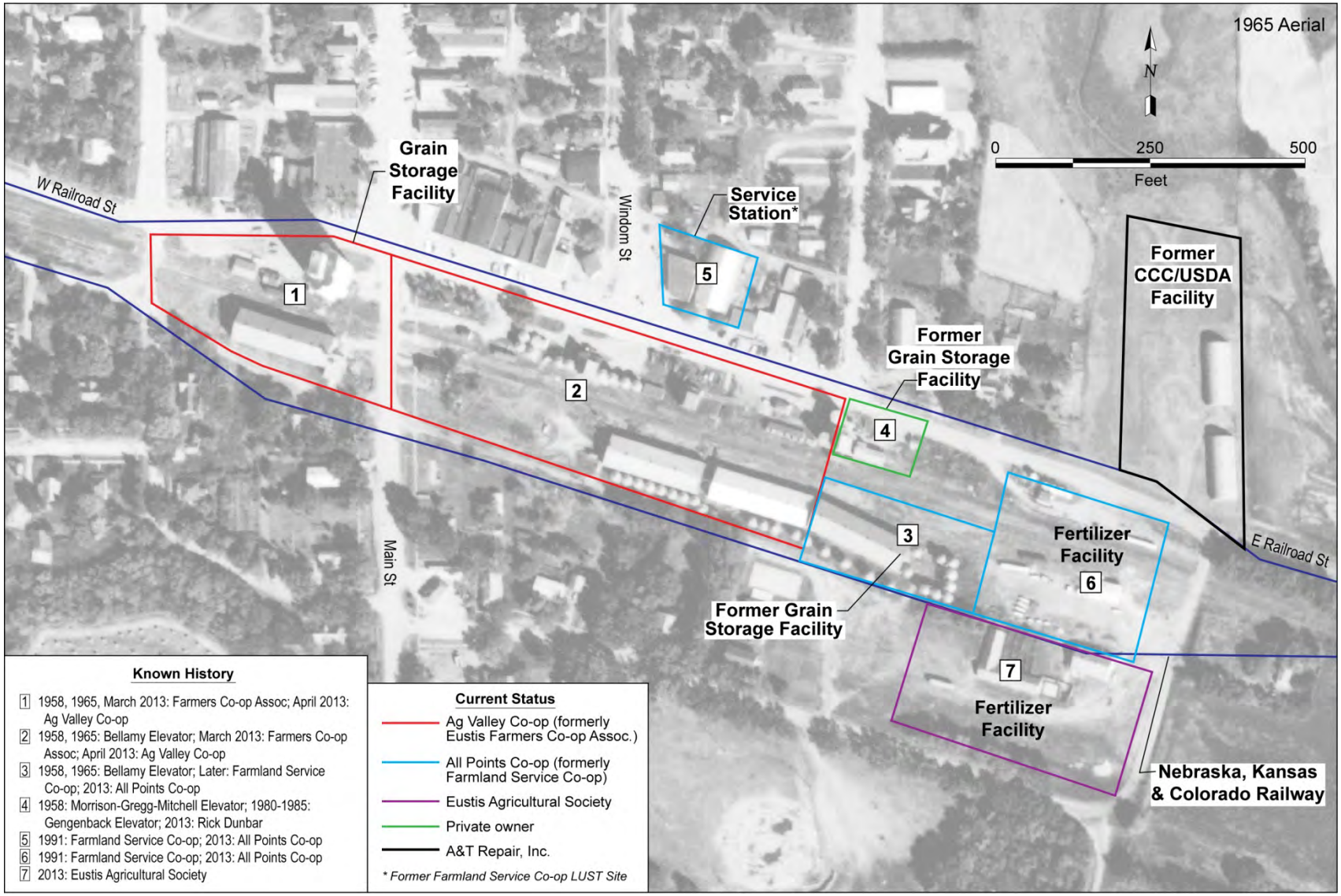

FIGURE 2.9 Locations of the former CCC/USDA grain storage facility near the southeast edge of Eustis and private grain storage facilities near and along the railroad right-of-way, as interpreted from a 1965 aerial photograph, property records, and local community information. Source of photograph: USDA (1965).

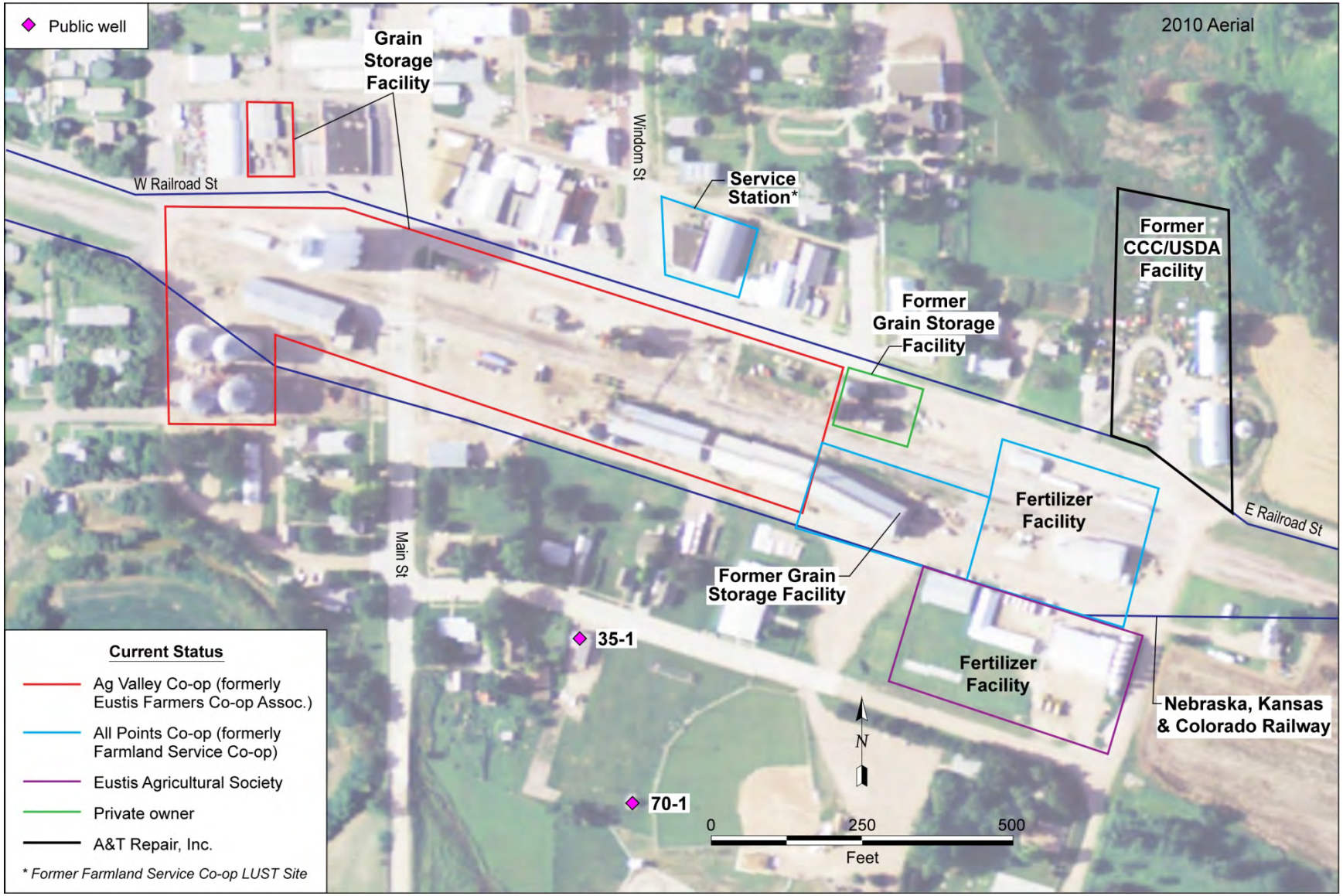

FIGURE 2.10 Current boundaries and ownership for properties related to grain storage operations at Eustis. Source of photograph: USDA (2010).

3 Proposed Technical Program for the Phase I Investigation

The investigative program outlined here focuses on the potential relationship of the former CCC/USDA facility at Eustis to carbon tetrachloride contamination found in the public water supply wells — particularly well PWS 70-1, which is approximately 1,000 ft southwest of the former CCC/USDA facility. A phased approach is proposed to optimize the field investigation by incorporating new results from each previous phase, as well as input from the CCC/USDA and NDEQ project managers. The goal of the proposed program is to identify and characterize any subsurface contamination associated with the former CCC/USDA facility and its relationship to the groundwater contamination found in the public water supply wells, as well as to generate data for estimation of potential risks to human health and the environment. This section presents the technical objectives and tasks for the Phase I investigation.

3.1 Technical Objectives of the Phase I Investigation

The proposed technical objectives for the Phase I investigation are as follows:

- Determine the presence of a potential soil source of carbon tetrachloride in the vadose zone beneath the former CCC/USDA facility.
- Characterize the site-specific geology and hydrogeology at the former CCC/USDA facility.
- Delineate the distribution of carbon tetrachloride and its daughter products in groundwater at the former CCC/USDA facility.
- Obtain information on groundwater flow patterns that affect potential off-site contaminant migration from the former CCC/USDA facility.
- Identify and sample private wells downgradient from the former CCC/USDA facility.

3.2 Phase I Investigation Tasks

To address the technical objectives in Section 3.1, the investigative activities recommended for the Phase I program will include the five tasks discussed below. Tasks 1-3 will be undertaken on the former CCC/USDA facility. Data collected in Tasks 1-3 will be evaluated to determine whether implementation of the subsequent tasks is necessary. If groundwater contamination in the Ogallala aquifer is confirmed on the former CCC/USDA facility, Tasks 4-5 will be performed outside the former facility. The tasks discussed below are summarized in Table 3.1. Site-specific elements of the investigative approach and methods for implementing the proposed investigation program are discussed in Section 4.

3.2.1 Task 1: Determine the Presence of a Potential Soil Source of Carbon Tetrachloride in the Vadose Zone beneath the Former CCC/USDA Facility

A complete review of all publicly available documents from previous investigations (Section 2) indicated that no investigation has been conducted on the former CCC/USDA facility. To identify possible evidence of a soil source in the vadose zone beneath the former CCC/USDA facility, we propose two soil sampling activities: (1) initial sampling of shallow soils at locations surrounding grain storage structures and (2) targeted soil sampling of deeper soils (above the saturated zone) at locations selected on the basis of the findings for the shallow soils. Samples of shallow soils will be collected by using a cone penetrometer (CPT) or other direct-push technique, while samples of deeper soils will be collected with the CPT or with a sonic drilling rig if necessary. Sampling will be performed according to methods specified in Section 4.

3.2.1.1 Task 1a: Shallow Soil Sampling

The initial shallow soil sampling is designed to screen for residual fumigant-related contaminants in shallow soils as an indicator of possible historical surface release of fumigant, as well as potential contamination of underlying deeper soil and potential pathways for contaminant migration from shallow soil to groundwater. Previous Argonne work (Alvarado and Rose 2004) demonstrated that the analysis of shallow soils for carbon tetrachloride and its daughter products (chloroform and methylene chloride) by a headspace method can serve as a screening tool to identify possible soil contamination in underlying deeper soils and groundwater. The headspace

data are not used quantitatively but are examined for contaminant distribution patterns, in order to prioritize areas for follow-up sampling and analysis of deeper soils and underlying groundwater. The shallow soils will also be analyzed by a purge-and-trap method with analysis on a gas-chromatography-mass spectrometry (GC-MS) system to identify potential health risks associated with direct exposure to the shallow soils.

The initial locations for shallow soil sampling will target former grain storage structures and driveways at the former CCC/USDA facility. These locations are expected to have been the most vulnerable to potential releases of carbon tetrachloride during grain storage and handling of fumigant containers or related equipment. On the basis of the operational setting of the former CCC/USDA facility, as shown in the 1958 aerial photo (Figure 3.1, left), 20 locations for shallow soil sampling are recommended. Of these locations, 8 surround the former grain bins to the west, 8 are around the Quonsets and the former storage building to the east, 3 lie along the former driveway in the center of the facility, and 1 is between the entrance doors of the Quonsets (a common point for identification of surface contamination). These locations were selected with consideration for accessibility in the current operational setting of an auto repair shop, as shown in the 2010 aerial photo (Figure 3.1, right). These sampling locations might be adjusted further during field implementation to minimize the impact on the business operation at the auto repair shop and/or to meet requests of the property owner.

In addition to shallow soil sampling, soil gas samples will be collected below the existing Quonset structure to provide a basis for assessing potential future pathways for vapor intrusion at the former CCC/USDA facility.

The following activities are recommended for the initial survey of shallow soils at the former CCC/USDA facility (Task 1a):

- Vertical soil profiling will be performed at all survey locations. For each profile, soil samples will be collected at intervals of about 4 ft, from the surface to 28 ft BGL (sampling depths of 2 ft, 6 ft, 10 ft, 14 ft, 18 ft, 22 ft, and 26 ft BGL), or at significant changes in the soil profile.

- Analyses for VOCs with a headspace method will be conducted by the Applied Geosciences and Environmental Management (AGEM) Laboratory at Argonne on the second day for all shallow soil samples collected, in order to

identify patterns of carbon tetrachloride, chloroform, and methylene chloride contamination in shallow soils and determine subsequent sampling locations for deeper soils.

- Analyses for VOCs with a purge-and-trap method will be conducted subsequently for all shallow soil samples to provide a quantitative basis for evaluating risk due to soil contamination.

- Soil gas sampling will be conducted within the footprints of the Quonset structures if access to the inside of the existing Quonset structure is permitted. Two soil gas sampling points are proposed: one for each Quonset, in a central portion of the structure if possible. The exact location will be determined according to restrictions associated with the owner's permission, to minimize impact to the business at the auto repair shop. Soil gas samples will be collected by using a small Geoprobe unit with a Post-Run Tubing (PRT) system (http://geoprobe.com/sites/default/files/pdfs/soil_gas_prt_oper.pdf) at a depth of 200 cm (approximately 6.5 ft BGL). The samples will be stored in metal, certified-clean, 1-L gas canisters.

- Soil gas samples collected in 1-L canisters will be shipped to TestAmerica Laboratories, Inc., South Burlington, Vermont, for VOCs analysis with EPA Method TO-15.

3.2.1.2 Task 1b: Targeted Soil Sampling for the Deeper Soils above the Saturated Zone

The contaminant distribution patterns in shallow soils at the former CCC/USDA facility will be evaluated to identify plausible pathways for contaminant migration to deeper soils and groundwater. Up to five locations with evidence of plausible pathways will be selected for sampling of deeper soils. If no plausible pathways are identified, sampling of deeper soils will be conducted at the four tentative locations shown in Figure 3.2. One of these tentative locations is at the storage building at the northern end of the former grain storage area, one is in the middle of the row of grain bins, and two are near the southern boundary of the former facility (one at the southern end of the row of grain bins to the west and the other at the southern end of the

Quonsets to the east). The actual locations of deeper soil sampling will be adjusted on the basis of the results from the shallow soil sampling (Section 3.2.1.1).

The activities proposed for sampling of deeper soils at the former CCC/USDA facility (Task 1b) are as follows:

- Vertical soil profiling will be performed at all selected locations targeting deeper soils. For each profile, soil samples will be collected at intervals of 5-10 ft, from a depth of 30 ft BGL to the top of the saturated loess unit or any water-bearing interval. The depth of the saturated loess unit is expected to be approximately 95-120 ft BGL at the former CCC/USDA facility.

- All soil samples will be analyzed for VOCs with a purge-and-trap method.

- At each CPT investigation location, the CPT sensors will be used to collect electronic logs. The CPT sensor logs will be analyzed for general information on changes in lithology, which will provide further guidance for confirmatory sampling at selected intervals. Depth of penetration could be a limiting factor in the use of the CPT for deeper soil sampling.

- Continuous cores will be collected and analyzed visually for lithologic evaluation and description. At selected intervals, soil property testing, grain size analysis, and other chemical analyses will be performed, as necessary, for the collected core samples.

- Groundwater samples will be collected from the identified saturated loess unit and all water-bearing intervals that produce enough water for sampling.

The results of vertical soil profiling will provide a scientific basis for determining whether a soil source of carbon tetrachloride exists at the former CCC/USDA facility, as well as the potential for a soil-to-groundwater migration pathway.

3.2.2 Task 2: Characterize the Site-Specific Geology and Hydrogeology at the Former CCC/USDA Facility

As discussed in Section 2.3, local geologic units expected to be penetrated at the former CCC/USDA facility, from top to bottom, are as follows: (1) an undifferentiated loess unit (silt and clay); (2) the Ogallala Group (silt, sand, and sandstone); and (3) Niobrara chalk (Figures 2.6 and 2.7). The local major aquifer is the Ogallala Group, containing alternating beds of silt, sand, sand and gravel, and sandstone. However, the number, thickness, and depth of the permeable beds within the Ogallala Group at Eustis might be heterogeneous and laterally discontinuous. To gain a better understanding of the local Ogallala aquifer and assist in groundwater sampling, one deep boring for lithologic coring will be conducted at one of the deeper soil sampling locations on the former CCC/USDA facility (Figure 3.2). The location of this deep boring will be based on the results of the investigations described in Section 3.2.1, to target possible pathways of soil contamination to groundwater in the aquifer. Specifically, the carbon tetrachloride distribution in the saturated loess unit at the deeper soil sampling points (Section 3.2.1.2) will be used to guide the selection of the deep boring location. The sonic drilling rig will be used to penetrate the deep horizons.

The recommended activities associated with the deep boring at the former CCC/USDA facility (Task 2) are follows:

- Continuous core will be collected to a depth of approximately 340 ft BGL, correlating with or below the elevations at the bottoms of wells PWS 70-1 and PWS 91-1. On the basis of the existing water well records in the vicinity of the former CCC/USDA facility, the stratigraphic units expected to be penetrated are (1) the Quaternary loess unit (170-200 ft thick) and (2) the upper part of Tertiary Ogallala Group (140-170 ft thick). The core collected will be analyzed visually, and the lithology will be described. At selected intervals, soil property testing, grain size analysis, and other chemical analyses will be performed, as necessary, for the collected core samples.

- The information on lithology, soil properties, and water content and recovery collected from this deep boring (to approximately 340 ft BGL) and other deeper soil sampling locations (to roughly 120 ft BGL; Section 3.2.1.2) will be evaluated to determine the hydrostratigraphic sequence, including the confining layer, aquifer, and relatively more permeable intervals within the

aquifer. The interpreted hydrogeologic sequence and its properties will guide the collection of groundwater samples in the subsequent task (Section 3.2.3).

3.2.3 Task 3: Delineate the Distribution of Carbon Tetrachloride and Its Daughter Products in Groundwater at the Former CCC/USDA Facility

To determine the presence of carbon tetrachloride and its daughter products (chloroform and methylene chloride) and delineate its lateral and vertical distribution in groundwater beneath the former CCC/USDA facility, groundwater samples will be collected at selected deeper soil sampling points (Section 3.2.1.2) and the deep boring for lithologic identification (Section 3.2.2). The targeted intervals for groundwater sampling will include (1) saturated intervals in the loess unit at the deeper soil sampling points (Section 3.2.1.2) and (2) permeable units within the underlying Ogallala aquifer at the deep boring location (Section 3.2.2). On the basis of the results of the nearby LUST investigation (GSI 1991; Section 2.2.1), the first saturated interval of the loess unit is expected to occur at 95-120 ft BGL at the former CCC/USDA facility. Beds of relatively thick sand and gravel likely represent the permeable intervals in the Ogallala aquifer. Drilling logs show that these relatively permeable beds were selected as screen intervals for wells PWS 70-1 and PWS 91-1. In the present investigation, these permeable beds will be targeted for groundwater sampling in the aquifer.

The proposed activities for delineation of contamination in groundwater at the former CCC/USDA facility (Task 3) are as follows:

- Groundwater samples will be collected from the first saturated interval encountered in the loess unit at the deeper soil sampling locations at the former CCC/USDA facility (Section 3.2.1.2). The results of groundwater sampling will be evaluated to determine the lateral distribution of carbon tetrachloride, chloroform, and methylene chloride in the saturated loess unit.

- Permeable beds within the Ogallala aquifer will be identified by coring the entire section of Ogallala aquifer penetrated at the deep borehole discussed in Section 3.2.2. Observations of lithology, grain size, thickness, and water recovery will be considered in the selection of relatively permeable intervals to be sampled. The number of permeable zones might vary laterally. However, at least two relatively thick permeable units (if identified) will be sampled at

the former CCC/USDA facility to determine the vertical distribution of contaminants.

- All groundwater samples will be analyzed for VOCs to identify the presence and concentrations of carbon tetrachloride, chloroform, and methylene chloride.

- Three monitoring wells will be installed with a drilling rig in the first saturated interval in the loess unit and in two relatively thick, relatively permeable zones within the Ogallala aquifer, to monitor groundwater contamination and groundwater levels at the former CCC/USDA facility. The well depths are expected to be less than 120 ft, 240 ft, and 340 ft BGL, respectively. All wells will be completed in accordance with Nebraska regulations, Title 178 NAC 12.

3.2.4 Task 4: Obtain Information on the Groundwater Flow Patterns that Affect Potential Off-Site Contaminant Migration from the Former CCC/USDA Facility

The NDEQ WHP Program suggests that the groundwater in the Ogallala aquifer generally flows toward the south-southwest in the regional area that encompasses the village of Eustis. However, there are no records of actual measurements of groundwater levels in response to pumping of the public water supply wells in the vicinity of the former CCC/USDA facility. Information on the site-specific groundwater flow patterns and their variations is critical for determining the potential for off-site contaminant migration beneath the former CCC/USDA facility, along with the possible effects of seasonal variations and/or local pumping events. Therefore, if the presence of groundwater contamination is identified beneath the former CCC/USDA facility (Section 3.2.3), a preliminary groundwater monitoring network will be established during the Phase I investigation. Two additional groundwater monitoring points outside the former CCC/USDA facility are recommended to form the monitoring network to establish the flow direction. The locations of these two possible monitoring points are shown in Figure 3.3. One is located southwest of the former CCC/USDA facility, toward well PWS 70-1, and the other is located northwest of the former CCC/USDA facility, toward well PWS 91-1.

The proposed activities for determining groundwater flow patterns (Task 4) are as follows:

- At the two monitoring points shown in Figure 3.3, lithologic cores will be examined to identify the relatively thick permeable units within the Ogallala aquifer. Groundwater samples will be collected from these units. The number and distribution of permeable units might vary laterally. However, at least two relatively thick permeable units will be sampled at each monitoring point to determine the presence of contaminants and identify the appropriate intervals to screen in the monitoring wells. In addition, at selected intervals, soil property testing, grain size analysis, and other chemical analyses will be performed, focusing on the targeted permeable units.

- All groundwater samples collected from the selected permeable intervals will be analyzed for VOCs to identify the presence and concentrations of carbon tetrachloride, chloroform, and methylene chloride.

- A pair of monitoring wells will be installed separately, in close proximity to each other, at each monitoring point. One well in each pair will be installed into the upper part of the Ogallala aquifer, and the other well will be installed into the middle part of the aquifer. The screen for each monitoring well will encompass the interval of a relatively thick permeable unit. If multiple thick permeable units are present, the unit to be targeted by the screen interval will be selected to correspond in elevation with the public well screen intervals and the identified contamination in groundwater. The lithologic logs of the existing public wells show that the screen intervals in these wells also target the relatively permeable zones in the Ogallala aquifer. The depths of the monitoring wells are expected to be less than 220 ft BGL and 320 ft BGL, respectively, for the southwest monitoring point and 260 ft BGL and 360 ft BGL, respectively, for the northwest monitoring point. The drilling rig will be used for well installation in accordance with Title 178 NAC 12.

- Groundwater levels will be measured in all wells at least 24 h after well completion (and after the wells have stabilized). The locations of all monitoring wells will be determined by a professional, licensed surveyor, in relation to state coordinates. The surveyor will determine the elevation of the top of each well and the designated reference point in each well for water level measurement.

- Groundwater level fluctuations will be monitored continuously over a period of 6-12 months. Automatic water level sensors and data loggers will be installed in all monitoring wells to identify the effects on the flow pattern of pumping at the public water supply wells, any other local water use, and seasonal variations in the groundwater system.

- Results of the investigation for soil and groundwater contamination at the former CCC/USDA facility generated from Tasks 1-3, together with the groundwater flow patterns and variations in response to pumping at the public water supply wells and seasonal variations identified in Task 4, will be compiled to determine the configuration of the contaminant plume and the primary direction(s) of groundwater flow and contaminant migration under the site-specific conditions in the vicinity of the former CCC/USDA facility.

3.2.5 Task 5: Identify and Sample Private Wells Downgradient from the Former CCC/USDA Facility

The private wells in the vicinity of Eustis were tested in 1996, 1997, and 2012. No carbon tetrachloride or chloroform was detected. However, if the presence of groundwater contamination in the Ogallala aquifer is identified beneath the former CCC/USDA facility (Section 3.2.3), private wells located downgradient from the former facility will be reevaluated in this task.

The proposed activities for this task are as follows:

- Identify and locate all private wells within 0.5 mi downgradient from the former CCC/USDA facility. The local groundwater flow pattern in the Ogallala aquifer, as determined in Task 4 (Section 3.2.4), will be used to guide the search for appropriate private wells. The search will include obtaining data from state water well registration records and consultation with the village to locate older private wells that predate the state records.

- Collect groundwater samples from all identified private wells for analysis for carbon tetrachloride, chloroform, and methylene chloride.

TABLE 3.1 Summary of Eustis investigation tasks.

				Locations		Equipment					
Task	Objective	Medium	Depth (ft BGL)	On-Site	Off-Site	Direct Push	Drill Rig	CPT Electronics	Coring	Section	Figure
1a	Shallow soil sampling	Soil profiles	2, 6, 10, 14, 18, 22, 26	20	–	CPT	–	x[a]	x	3.2.1.1	3.1
1a	Soil gas sampling	Soil gas	~ 6.5	2	–	Geo-probe	–	–	–	3.2.1.1	–
1b	Deeper soil sampling	Soil profiles	~ 30 depths to top of saturated loess (95-120)[b]	≤ 5	–	CPT[c]	x[d]	x[c]	x	3.2.1.2	3.2
1b	GW sampling	Groundwater	As present	≤ 5	–	CPT[c]	x[d]	x[c]		3.2.1.2	3.2
2	Site-specific hydrostratigraphy	Soil cores	340	1	–	–	x	–	x	3.2.2	–
3	Groundwater sampling	Groundwater	95-120 (saturated loess); > 170-340 (Ogallala aquifer)	Task 1b locations and Task 2 deep boring	–	–	x	–	–	3.2.3	–
3	Monitoring well installation	Groundwater	120, 240, 340	3	–	–	x	–	–	3.2.3	–
4	Groundwater sampling and monitoring well installation	Groundwater and soil cores	220-260, 320-360	–	2[e]	–	x	–	X	3.2.4	3.3
5	Private well sampling	Groundwater	Various	–	x	–	–	–	–	3.2.5	–

[a] Electronic logging will be conducted at a few of the 20 locations.

[b] Deeper soil samples will be collected at intervals of 5-10 ft.

[c] The CPT will be used if it can penetrate the target unit.

[d] The drilling rig will be used if the CPT cannot penetrate the target unit.

[e] Two wells will be installed separately at each location, in close proximity to each other, for a total of four monitoring wells

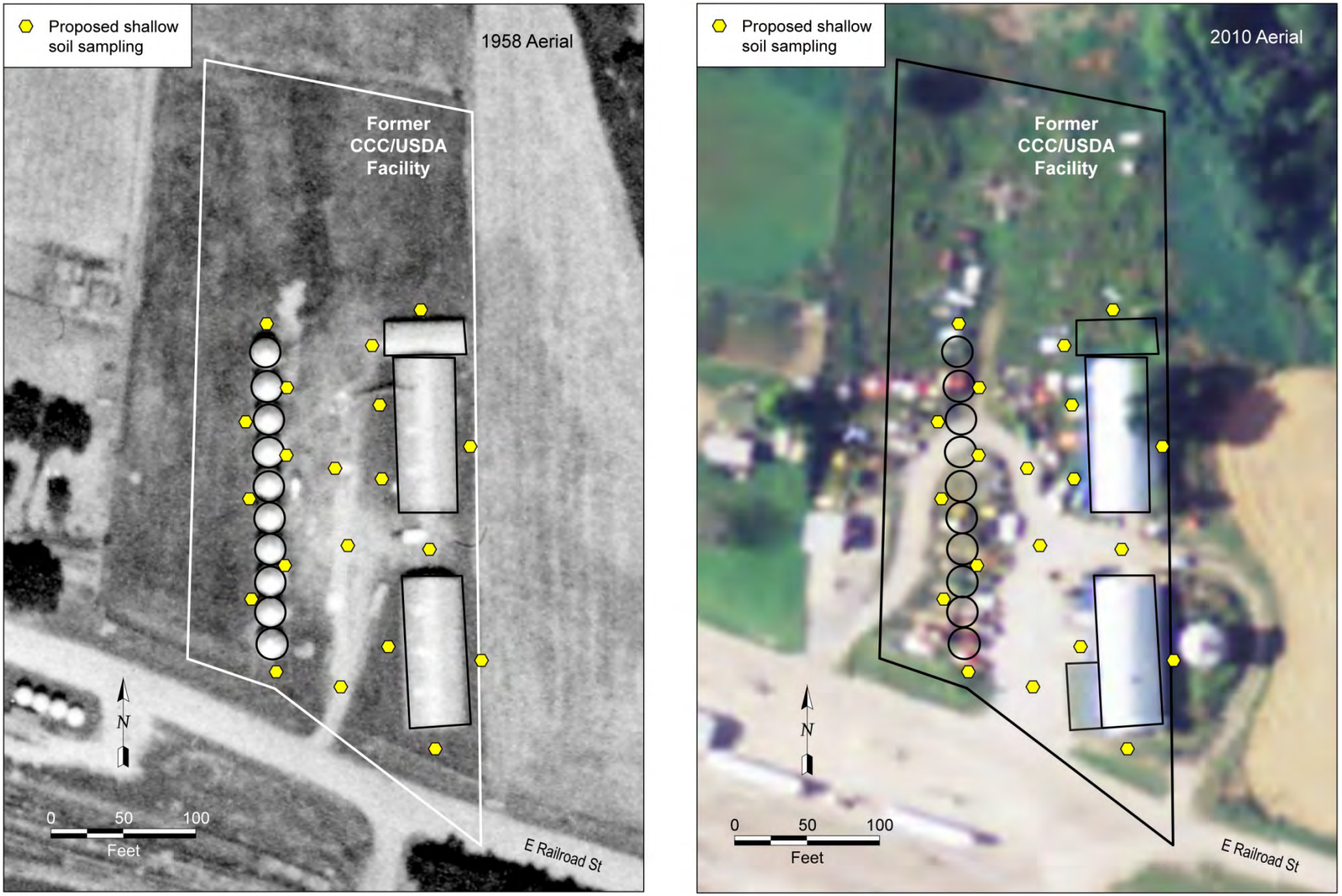

FIGURE 3.1 Proposed shallow soil sampling locations on the former CCC/USDA property (Task 1a). Source of photographs: USDA (1958, 2010).

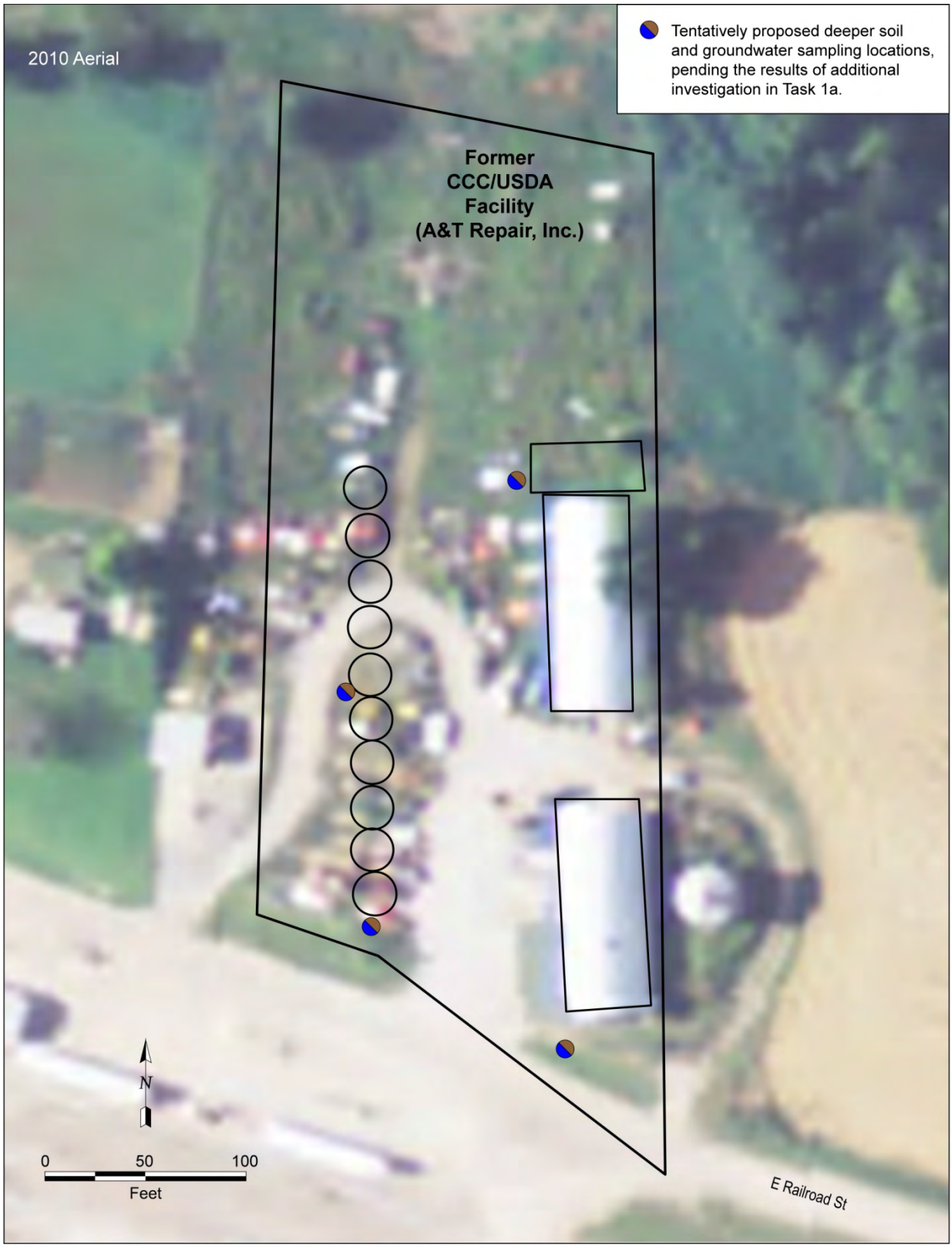

FIGURE 3.2 Tentatively proposed deeper soil and groundwater sampling locations on the former CCC/USDA property (Task 1b), pending the results of shallow soil sampling in Task 1a. Source of photograph: USDA (2010).

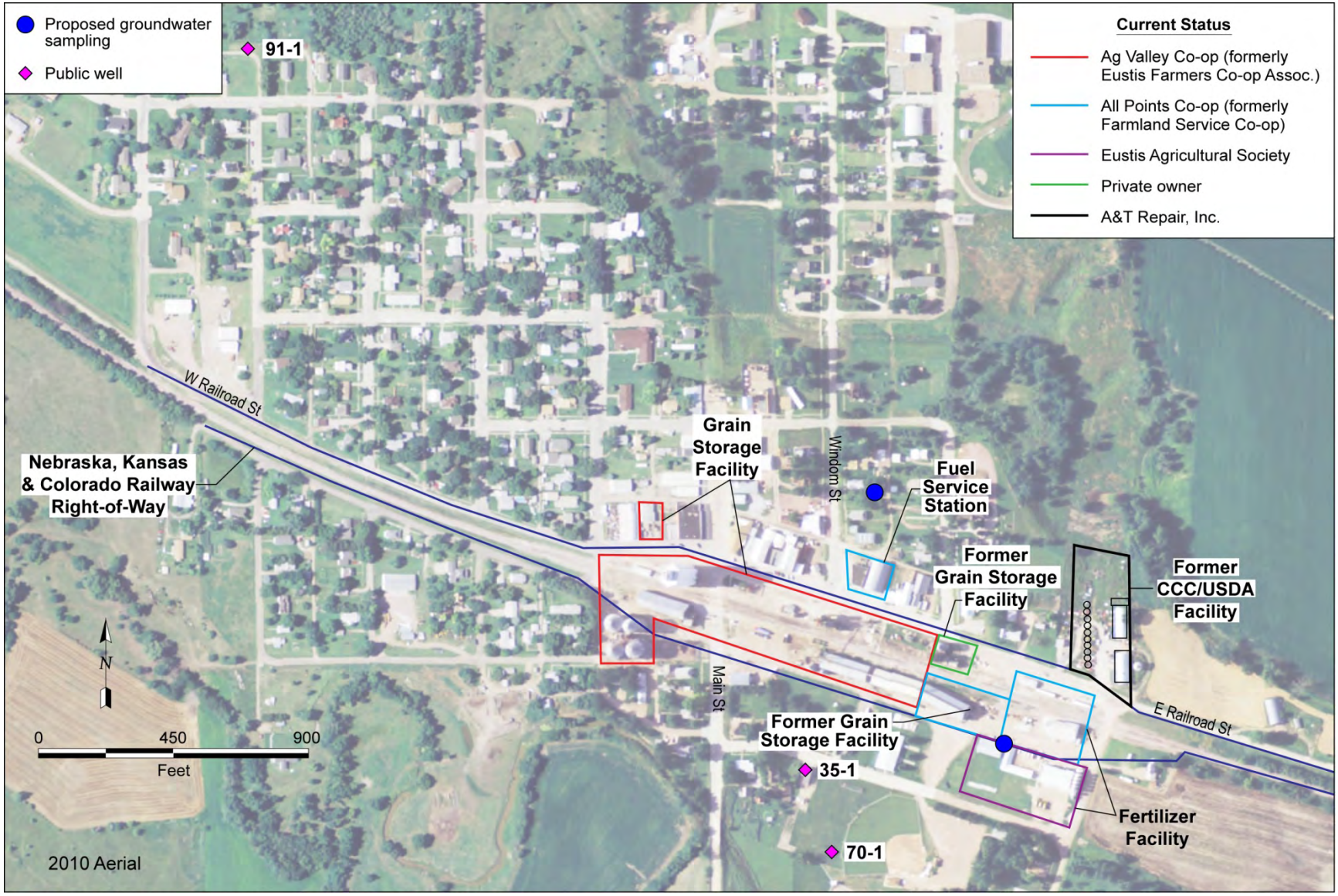

FIGURE 3.3 Proposed locations for deep boring with the sonic drilling rig for groundwater sampling and water level monitoring outside the former CCC/USDA facility (Task 4). Source of photograph: USDA (2010).

4 Investigation Methods

The site-specific investigative technologies, field procedures, and analytical methods to address the technical objectives discussed in Section 3 are discussed below. Argonne will implement the proposed tasks in accord with established standard operating procedures, relevant state regulations, quality assurance-quality control measures, and general health and safety policies.

4.1 Methods for Shallow Soil Sampling and Analysis

Shallow soil sampling (Section 3.2.1.1) will be performed by using the Argonne 22-ton, track-mounted CPT crawler. At each investigation location, a 4-ft-long core barrel with a 1.125-in.-I.D. disposable liner (Geoprobe dual tube coring system) will be advanced with the CPT unit to collect samples of shallow soils at anticipated depths of 2 ft, 6 ft, 10 ft,14 ft, 18 ft, 22 ft, and 26 ft BGL.

The soil samples recovered from the core barrel will be placed immediately in jars, then sealed and placed in coolers with dry ice at −78.5ºC for overnight shipment to the AGEM Laboratory for rapid-turnaround analysis. The basic premise supporting the use of dry ice for sample preservation is that although VOCs are volatile at room temperature, their volatility decreases with immediate subzero temperature reduction. For example, the vapor pressure of carbon tetrachloride decreases by four orders of magnitude when the temperature changes from 15.8°C to -79.4°C (CRC 1999). In a previous study, we evaluated the recovery of carbon tetrachloride in soil samples stored on dry ice and demonstrated that preservation with dry ice is a better option than traditional procedures involving chemical preservation methods (Alvarado and Rose 2004).

The shallow soil samples will be analyzed initially by a headspace method on a gas chromatograph system with an electron capture detector (modified EPA method 5021). The headspace method was developed previously by Argonne (Alvarado and Rose 2004. It provides an improved, rapid analytical process that is sensitive to low concentrations. The results from the headspace analysis can be used qualitatively to facilitate initial screening that will guide subsequent field activities. At a later time, all soils samples will be analyzed further by a purge-and-trap sample preparation method with analysis for VOCs on a GC-MS system (EPA

Methods 5030B and 8260B). The results of the purge-and-trap analysis will be used as a quantitative base for risk assessment.

4.2 Methods for Soil Gas Sampling and Analysis

Soil gas samples will be collected by using a small Geoprobe unit with a PRT system. Prior to boring, an expandable point holder will be attached to the lead rod of the Geoprobe unit, within the rod bore, and an O-ring will be used to place an expandable point in the holder. The rod will be pushed through the concrete floor inside the Quonset structure and advanced to 7 ft (215 cm) BGL. The stainless steel PRT adapter with the attached tubing will be then inserted inside the rod bore and lowered to the bottom of the rod bore. The top end of the tube will be sealed to minimize gas exchange with ambient air. The PRT adapter will be threaded into the reverse-thread fitting at the top of the expandable point holder by manually rotating the tubing counterclockwise until the O-ring on the adapter seals against the point holder. The rod will be retracted back to 6 ft (185 cm) BGL, and a 1-ft interval will be opened for sampling. To remove the residual air in the system, the tubing will be purged before sample collection. A soil gas sample will be then withdrawn through the tubing into a metal, certified-clean, 1-L gas canister. After sampling is complete, the rod will be removed, the borehole in the soil will be plugged, and the hole in the concrete floor will be sealed with cement.

All soil gas samples will be shipped immediately to TestAmerica Laboratories, Inc., South Burlington, Vermont, for VOCs analysis with EPA Method TO-15.

4.3 Methods for Deeper Soil Sampling and Analysis

Deeper soil sampling (Section 3.2.1.2) will be performed by using the Argonne 22-ton, track-mounted CPT crawler or a sonic drilling rig, if necessary, to achieve the target depth of the first saturated interval of the loess unit (at approximately 120 ft BGL). At each investigation location, soil samples will be collected at depth intervals of 4-8 ft, from 30 ft BGL to the depth of the first saturated interval of the loess unit. Samples will be taken with the CPT sampling method described in Section 4.1. If drilling is necessary to reach the saturated loess unit at roughly 120 ft BGL, a sonic drilling rig will be employed. To collect soil samples or soil cores with the sonic rig, an inner drill string with core barrel will be advanced 5 ft or 10 ft at a time,

followed by advancement of an outer sonic casing. The inner barrel will then be pulled, and the soil core will be extracted for sampling or lithologic evaluation. Samples of deeper soils will be collected every 5-10 ft from the cores recovered with the sonic drilling rig.

The soil samples recovered from the core barrel will be placed immediately in jars, then sealed, preserved on dry ice in the field, and shipped to the AGEM Laboratory for purge-and-trap sample preparation with analysis on a GC-MS system (EPA Methods 5030B and 8260B). As discussed in Section 4.1, preservation of soil samples with dry ice will improve the recovery of VOCs, compared to traditional procedures using sample additives.

At selected locations and depth intervals, soil samples will be also collected from cores for soil property testing (e.g., moisture content, porosity, bulk density), grain size analysis, and other chemical analysis (total organic carbon, etc.).

4.4 Methods for Deep Boring and Logging

The deep subsurface borings discussed in Section 3.2.2 and Section 3.2.4 are proposed to characterize the site-specific geologic and hydrogeologic sequences, as an aid in guiding groundwater sampling and to provide better understanding of the site-specific conceptual model. The borings will be implemented by using the CPT and/or a sonic drilling rig.

Initially, at each proposed deep boring location, the electronic CPT cone will be used to acquire continuous geomechanical measurements of tip pressure, sleeve friction, conductivity (if possible), and tip-versus-sleeve ratio. The resulting logs will document sensor responses to the vertical sequence of sediments penetrated, for possible correlation with the site-specific lithologies and stratigraphy, as well as the presence of water (if possible). The findings will be verified in corresponding cores recovered later with the CPT through a 4-ft-long soil coring barrel fitted into the push rod.

If the CPT cannot reach the desired depth to the saturated loess unit for the deeper soil sampling points (Figure 3.2), boring will be conducted with a sonic drilling rig. The 4-in.-diameter cores will be recovered by using a 6-in.-diameter inner core barrel at depth increments of approximately 10 ft. The drilling will take place within an 8-in.-diameter overriding casing,

which will be advanced as the coring progresses to prevent potential cross-contamination of the deeper soil intervals by any contamination that might be present at shallow depths.

For the deep boring to a proposed depth of approximately 340 ft BGL at the former CCC/USDA facility and the two borings (320-360 ft BGL) outside the former CCC/USDA facility (southwest and northwest points; Figure 3.3), the sonic drilling rig is expected to be required for penetration. Cores will be collected as discussed above.

At each boring location, cores recovered by either the CPT or the sonic drilling rig will be examined to evaluate lithology and to identify permeable units within the Ogallala aquifer, as well as water content and water recovery conditions. The results of this evaluation will be documented in a boring log for each boring location. Information on the vertical distribution of various properties identified by analyzing the continuous cores will be evaluated to determine the site-specific stratigraphic and hydrogeologic sequences in the context of the local hydrogeologic setting.

4.5 Methods for Groundwater Sampling and Analyses

As discussed in Sections 3.2.1.2 and 3.2.3, groundwater samples will be collected from the bases of the vertical soil profiles at the deeper soil sampling points (in the saturated loess unit), as well as from the permeable units in the Ogallala aquifer at the deep boring on the former CCC/USDA facility and the two deep borings outside the former CCC/USDA facility.

4.5.1 Groundwater Sampling with the Cone Penetrometer

At each CPT deeper soil sampling point (Section 3.2.1.2), the CPT rods will be used to push a sacrificial tip and 0.5-in.-I.D. polyvinyl chloride (PVC) filter screen and riser to the desired maximum sampling depth. The rods will then be partially withdrawn to the desired upper sampling depth, to expose the screen to the formation waters. Water samples will be collected from the PVC casing by using a bailer, without purging, for preservation and analysis as described in Section 4.4.4.

4.5.2 Groundwater Sampling with the Drilling Rig

At deep borings implemented with the sonic drilling rig (Section 3.2.3), relatively thick permeable units will be the target intervals for groundwater sampling. Once the desired sampling interval is confirmed by the recovered core, as discussed in Section 4.3, groundwater will be collected with a bailer from the portion of the borehole that is exposed to the formation, between the bottom of the overriding (outer) casing and the bottom of the borehole. A packer-and-riser technique in which a pair of packers is placed in the borehole on steel piping (a work string) will be employed for discrete groundwater sampling within the aquifer if necessary. With this technique, a straddle packer assembly will be lowered into the borehole to the desired depth. The pair of packers will then be inflated, so that groundwater samples can be collected in the interval between the two packers. Once the groundwater sampling is completed, the packers will be deflated and moved to the next zone of interest and re-inflated for the next sampling.

Water samples will be preserved and analyzed as described in Section 4.4.4.

4.5.3 Decontamination

Decontamination of the CPT and drilling rigs, tools, and equipment will be performed as needed, by using a hot-water pressure washer, to ensure the integrity of the media sampled for laboratory analysis at each sampling point.

4.5.4 Sample Preservation and Analysis

Groundwater samples collected with the CPT and the drilling rig will be preserved on ice at 4ºC and shipped overnight to the AGEM Laboratory for rapid-turnaround (24-h) analysis. Water samples will be analyzed by the purge-and-trap method on a GC-MS system (EPA Method 5030B and 8260B). To ensure reproducibility, a minimum of 10% of the water samples will be selected for verification analysis by a second laboratory (TestAmerica Laboratories, South Burlington, Vermont) with the EPA's Contract Laboratory Program (CLP) methods. An index to the EPA methods is online (http://www.epa.gov/epahome/index/).

In addition, groundwater samples selected for inorganic geochemical and/or isotope analysis will be preserved on ice at 4ºC and shipped overnight to TestAmerica Laboratories (South Burlington, Vermont) and the University of Miami (Miami, Florida) for analysis.

4.6 Methods for Installing Monitoring Wells and Abandoning Boreholes

Monitoring wells will be installed with a sonic drilling rig. The wells will consist of 2-in. PVC casing installed in 6.25-in.-diameter boreholes. Screens for the saturated loess unit will be 0.010-in. mill slot PVC, at the appropriate length for the depth. The screen size for intervals within the Ogallala aquifer will be selected according to a criterion based on retention of 50-60%, which is higher than that for a production water well, because these wells are only for monitoring purposes. The results of grain size analyses performed during installation of the public water supply wells by the village and previously during this Phase I investigation will be used to guide the selection of screen size. The filter pack size will be based on the well screen size, to retain 90% of filter pack materials. The filter pack will extend from 1 ft below the screen to 2 ft above the screened interval. A 2-ft to 5-ft bentonite pellet seal will be installed above the filter pack. The remainder of the hole will be sealed with a high-solids bentonite grout slurry by using a tremie pipe, from the top of the bentonite seal to within 3 ft of the ground surface. The surface will be completed with a 12-in. flush mount well cover, cemented in place. The top of the casing will be fitted with a 2-in. locking J-plug.

All wells will be constructed in accordance with Nebraska guidelines (Title 178 NAC 12). Any variances required will be obtained from the appropriate agency prior to installation. All investigation-derived waste (IDW) will be managed as described in Section 4.7. After installation, each well will be pumped and developed for a minimum of 2 h, or as determined by the attendant drilling engineer to be necessary.

All CPT investigation boreholes and all drilled boreholes that are not selected for completion as monitoring wells will be abandoned according to Nebraska requirements (Title 178 NAC 12).

4.7 Methods for Water Level Monitoring

Groundwater levels will be monitored continuously in all monitoring wells or in a subset of selected monitoring wells, as well as in selected public water supply wells (subject to access), by using programmable downhole pressure sensors and data loggers (Instrumentation Northwest PT2X™ devices). The data logger at each location will be programmed initially to record one measurement every 30 min. The data from the loggers will be downloaded after approximately one month of operation, and the resulting hydrographs will be examined for possible evidence of pumping effects at the public water supply wells and/or nearby private wells, as well as other short-term variations in the local groundwater levels. On the basis of these results, monitoring will either continue at the original measurement frequency, or the loggers will be reprogrammed to a recording interval suitable for extended monitoring. The monitoring period will be extended to 6-12 months to document possible variations in responses to pumping at well PWS 91-1 and also short-term, seasonal, or other potential changes in groundwater levels.

Groundwater levels will also be measured manually in all monitoring wells at each data logger downloading event, to confirm that the sensors and loggers are performing appropriately.

4.8 Methods for Handling and Disposal of Investigation-Derived Waste

The approach to handling and disposal of soil and water IDW will be as follows:

- Soil cores collected during sampling will be retained in core boxes for lithologic description and research. The cores will be transported to and stored at an Argonne facility for further reference.

- Soil IDW from drilling activities will be stored on-site in 55-gal drums or a roll-off container. A representative sample will be collected and analyzed for VOCs by the AGEM Laboratory and for TCLP (toxicity characteristic leaching procedure) volatiles by TestAmerica Laboratories, Inc., South Burlington, Vermont.

- A Solid Waste Disposal Authorization will be obtained from the NDEQ for disposal of soil in a permitted landfill. If analytical data indicate that the soils cannot be placed in a permitted landfill, alternative disposal methods will be proposed to the NDEQ for review.

- Water IDW will be stored on-site in 55-gal drums or polyurethane containers. All containers will be covered and stored on the site prior to disposal. The wastewater will be analyzed for VOCs by the AGEM Laboratory.

- If analytical results for the wastewater indicate concentrations of carbon tetrachloride, chloroform, and methylene chloride below the MCLs, then the water will be discharged on-site, away from known sensitive receptors. If the analytical results indicate concentrations above the MCLs, then the water will be disposed of at a wastewater treatment facility approved by the NDEQ.

4.9 Quality Assurance/Quality Control for Sampling and Analysis

Quality in sampling and analysis will be assured through documentation of activities, performance and system audits, and periodic evaluations of QC procedures. The project QA/QC requirements will be satisfied through periodic and final reviews covering all aspects of sampling, field measurements, chemical analyses, data collection, data reporting, instrument calibrations, routine maintenance of analytical equipment, and standardization procedures in analyses. In addition, technical review of the results will ensure that the stated objectives of the project are met.

Conditions significantly adverse to quality, their causes, and corrective actions taken will be documented and reported to the technical project manager, the QA/QC coordinator, and the AGEM program manager. Examples of such conditions are deficiencies in the use of procedures or instructions, failure to implement corrective actions in response to nonconformances with quality standards, and unexpected loss of or damage to documentation. Corrective action will be implemented in a timely manner, and the field team will be informed of the issue. Actions taken to correct problems or deficiencies during sampling in the field or during laboratory analyses will be documented and described in the QA portion of the sampling and analysis report.

4.9.1 Field Quality Assurance/Quality Control for Sampling and Analysis

4.9.1.1 Sample Collection

The following two major criteria must be met in sampling:

1. The samples must be a genuine representation of the conditions prevalent at the site.

2. Adequate numbers of samples must be available for meaningful characterization or monitoring of the site, in the judgment of the technical project manager and the AGEM program manager and with the concurrence of the CCC/USDA and MDNR project managers.

In some cases, it might not be possible to collect samples from an intended location because of access constraints. In such cases, alternate or additional samples may be collected, as appropriate, from more easily accessible areas, if this can be accomplished without compromising the original objectives of the work.

All samples will be recorded in a field document dedicated to the investigation at Eustis. Records will be as complete as possible, to support resolution of any issues that might arise in the future.

4.9.1.2 Calibration Procedures for Field Analytical Instruments

The technical project manager, in conjunction with team members, will ensures that instruments used for field measurements are properly calibrated, reliable, and in good working order. Standards will be protected from extreme weather conditions and will be discarded on the expiration date, so that outdated standards cannot be used inadvertently.

Calibration information for instruments used to measure the temperature, pH, and electrical conductivity of water samples in the field will be documented in a dedicated record for each instrument. The record will include the instrument’s name and model or serial number, the

date of calibration and calibration method, and the signature of the person performing the calibration. The record will also contain dated, signed entries for all actual field measurements.

4.9.1.3 Field Blanks, Field Rinsates, Field Replicates, and Trip Blanks

The QC samples collected as part of the field sampling activity will include field blanks, field rinsates, field replicates, and trip blanks. Field blanks and field rinsates are samples of waters used for and after decontamination of field equipment, respectively. Field replicates provide a measure of consistency in both sampling and analytical methodologies. Trip blanks will be included in each shipment of samples for VOCs analyses to demonstrate that cross-contamination of samples has not occurred during shipment. The nature and frequency of these types of samples are as follows:

- *Field Blanks*

  A field blank is a sample of the water used in the field for decontamination. This water will be obtained from an uncontaminated source in the field or transported to the field expressly for decontamination and other sampling activities. Blanks of other materials that might affect sample integrity will also be collected as necessary. Analysis of field blanks for VOCs will verify that contamination has not been introduced into the samples from outside sources. One field blank will be prepared during each sampling event when water is used.

- *Rinsates*

  Some equipment (e.g., sampling bailers) is used repeatedly in sampling activities. This equipment must be decontaminated after each use to avoid cross-contamination of samples. A rinsate sample consists of water rinsed over a piece of sampling equipment after it has been cleaned and decontaminated. Rinsate samples will be collected with a frequency of 1 sample per 20 pieces of equipment cleaned, with a minimum of 1 sample per cleaning session. All rinsate samples will be analyzed for VOCs.

- *Trip Blanks*

  Trip blanks (soil or water) may be prepared at the AGEM Laboratory or in another suitable uncontaminated area and transported to the field site. Trip blanks may also be prepared with appropriate care at the field site. The blank sample will be shipped to the laboratory along with the field samples for VOCs analyses. A trip blank will be included in each shipping container of samples. Trip blanks will be analyzed only for VOCs. Any indication of contamination will be reported to the field team immediately, so that action can be taken to identify the source of contamination and rectify the problem.

- *Field Replicates/Split Samples*

  Field replicates of soil, water, and vegetation samples are used to verify consistency in the sampling methodology and the reproducibility of the analytical results. The required frequency is 1 replicate for every 10 samples collected, but replicates will be collected more frequently if the particular situation warrants. All field replicates collected will be analyzed.

4.9.2 Laboratory Quality Assurance/Quality Control for Sampling and Analysis

4.9.2.1 Laboratory Duplicates

In addition to sample replicates prepared in the field, the analytical laboratory will select some samples at random for duplicate analyses. This procedure allows for quantitation of the precision of the laboratory analysis.

4.9.2.2 Volatile Organic Analysis

Samples collected for VOCs analyses will be shipped to the AGEM Laboratory or to an EPA-certified CLP laboratory for immediate analysis. Analysis of the samples will be prioritized in consultation with the technical project manager, so that the results can be used to optimize

decision making in the field. Water samples will be analyzed by using modifications of EPA Methods 5030B and 8260B (purge-and-trap method on a GC-MS system) or a modification of EPA Method 524.2 (for drinking water). Soil samples will be analyzed by using a modification of EPA Methods 5030B and 8260B (Level V). Vegetation samples and near-surface soil samples will be analyzed with a modification of EPA Method 5021 (headspace analysis on a GC with electron capture detection [GC-ECD]). Soil gas samples will be analyzed by an EPA-certified CLP laboratory using EPA Method TO-15.

In reviewing the analytical results, QA/QC procedures will be verified in the following laboratory-related areas:

- Chain-of-custody records for samples
- Storage of samples and sample extracts
- Holding times before analyses
- Calibration and maintenance of analytical instruments
- Performance standards for instruments (reproducibility, internal and external standards, spike recoveries, etc.)
- Field records

The verification involves thorough evaluation of laboratory practices and procedures, audits of field records, and review of data packages (both original and reduced forms of data) by the project QA/QC coordinator. The results of this evaluation, in keeping with EPA guidelines (EPA 2008), will be presented in the QA/QC portion of the sampling and analysis report.

At least 10% of all water and soil samples collected at a site in a given sampling event (or a minimum of 1 sample if fewer than 10 are collected) will be shipped to an EPA-certified CLP laboratory for a second analysis to verify the results obtained by the AGEM Laboratory. Samples may be sent directly to the CLP laboratory from the field, or they may be selected for verification analysis on the basis of the AGEM Laboratory's results. When possible, the samples selected in

the AGEM Laboratory will have a wide range of carbon tetrachloride values (from below the detection limit to high concentrations) to allow comparison of the analytical methods over the range of concentrations found. Water samples will be analyzed by the reference laboratory according to the CLP procedure SOW SOM01.2-trace (EPA 2011), with a quantitation limit of 5.0 μg/L. Soil samples will be analyzed by using EPA Method 8260B, as referenced in the EPA's SW-846 (EPA 1998), with a quantitation limit of 10 μg/kg. Each sample subjected to verification analysis by the reference laboratory will be accompanied by complete CLP documentation.

4.9.2.3 Other Analyses

Selected samples may be subjected to other analyses (unrelated to site contamination) to aid in development of the site hydrogeologic model. Groundwater samples may be selected for inorganic or tritium analysis to aid in characterization of groundwater geochemistry. Soil samples may be selected for analysis of physical parameters such as particle size, bulk density, or percent moisture. These analyses will be conducted by certified laboratories with accepted procedures. The analytical methodologies used and results of a review of QC procedures for these analyses will be presented in the sampling and analysis report as appropriate or requested.

4.9.3 Quality Assurance Records

Records that document quality must be assembled and maintained. Records must be legible, identifiable, and retrievable and must be protected against damage, deterioration, or loss. Such QA records pertain to all activities related to sampling and analysis. The QA records include but are not limited to soil boring logs, well completion logs, other field records, sample labels, and chain-of-custody records. These records will be retained for a minimum of ten years after the program ends.

4.9.3.1 Field Notes Related to Sample Collection

All field notes relating to the collection of samples will be placed in the permanent project records. Notes will provide information on the sampling conditions and sample handling

and collection methods. The sample identification number, the date and time of sampling, the place of collection (with a simple hand-drawn location map), the weather conditions at the time of sampling, and any measurements made by field monitoring equipment are the minimal data recorded. Each entry will be signed by the sampler.

4.9.3.2 Sample Labels

A uniquely numbered sample label will be affixed to each sample container to identify the sample; the date, time, and location of sampling; and the analysis to be performed.

4.9.3.3 Chain-of-Custody Records for Samples

A uniquely numbered chain-of-custody record must be maintained to track the possession of each sample throughout its history, from the time of collection to the time of delivery to the analytical laboratory. The chain-of-custody record is discussed in *Master Work Plan* (Argonne 2002). One copy of the chain-of-custody record will accompany each sample container. A second copy will be retained by the technical project manager until completion of the investigation, when it will be placed in the permanent project record.

4.9.4 Analytical Data Reduction, Validation, and Reporting

4.9.4.1 Analytical Data Reduction

All sampling logbooks and related records (for both sample collection and sample analysis) completed during individual tasks will be submitted to the QA/QC coordinator for storage with the project files. The analytical results, with all pertinent information about sample locations and sampling conditions, will be entered into a computer file for integration with results from other activities and for presentation in the final report.

4.9.4.2 Analytical Data Validation

If minimal QC requirements are not met by the analytical laboratory, all data from the associated batch of samples must be thoroughly scrutinized. If no analytical problems are found, the data and out-of-control parameter(s) will be discussed in the QA/QC section of the site-specific report. If problems with the analytical data are found, the samples associated with the batch will be reanalyzed, and the data from the reanalysis will be reported. If holding times defined in the procedure for the reanalysis are exceeded, both sets of data will be reported.

In the final report, all sample data will be presented, along with detection limits and concentrations found.

4.9.4.3 Analytical Data Reporting

For all analyses, the laboratory data package will show, at a minimum, traceability to the sample analyzed. The data package will contain the following information:

- Project identification
- Field sample number
- Laboratory sample number
- Sample matrix description
- Date of sample collection
- Date of sample receipt at the laboratory
- Analytical method description
- Individual parameter results

- Date of analysis (extraction, first runs, and subsequent runs)
- Quantitation limits achieved
- Dilution of concentration factors
- Corresponding QC data (to include method blanks, blanks/spikes, and continuing calibrations)
- Raw chromatogram data
- Chain-of-custody forms
- Case narrative (where appropriate)

4.10 Field Investigation Schedule

The proposed Phase I investigation will be conducted in one or more field sessions, as required to accomplish the program objectives.

The first field session include initial sampling of shallow soils at the former CCC/USDA facility (Figure 3.1; Section 3.2.1.1). The results of the first field session will be analyzed to determine the target locations for deeper soil and groundwater sampling, which will be implemented in the subsequent field session(s).

The second and third (if necessary) sessions will consist of the following:

- Deeper soil sampling to the saturated loess unit (< 120 ft) at the former CCC/USDA facility (Section 3.2.1.2; Figure 3.2).
- Coring and groundwater sampling at one deep boring at the former CCC/USDA facility (selected on the basis of results obtained in the deeper

soil sampling) and two deep borings located outside the former CCC/USDA facility (Sections 3.2.2, 3.2.3, and 3.2.4; Figures 3.2 and 3.3).

- Installation of monitoring wells at appropriate locations and depths (Section 3.2.4).

Field work will be conducted on cycles of approximately 10 days on and 4 days off, subject to the specific requirements of the activities being performed and the approval of the CCC/USDA and NDEQ project managers for subsequent phases and sessions.

5 Community Relations Plan

This community relations plan identifies issues of community concern regarding field work and outlines community relations activities to be conducted during the Phase I investigation at Eustis.

Community concern is likely to increase when the field work begins and Argonne's presence becomes apparent. Effective community relations will require close contact with residents, both within and outside the village limits. Information will be made available, as appropriate, in the local area to ensure that interested residents are adequately informed.

Argonne will develop a fact sheet that describes the investigation and will provide copies to the village office and to interested residents at and near the investigation area. The fact sheet will provide the names and contact information for the NDEQ and CCC/USDA officials and Argonne staff members involved in the investigation.

This community relations plan is divided into sections including site description, community background, community relations objectives, timing of community relations activities, and contact list of key officials.

5.1 Site Description

Section 2 of this report contains a complete description of the site and its history.

5.2 Community Background

The incorporated village of Eustis is governed by a village board chairman and village board. In addition to public works and other village responsibilities, the chairman and board have authority to provide and maintain the municipal water supply system. The board employs a full-time village water operator who is charged with maintaining the water system. The village operates an office that is staffed by the village clerk.

Residents within the limits of the village of Eustis receive their drinking water from the village public water supply system, which is currently supported by one well, PWS 91-1. The other well, PWS 70-1, was placed on standby/backup status in 2012, for emergence use only, after an elevated level of carbon tetrachloride was detected. The village successfully installed a test well for a new public well in late February 2013. The village subsequently sent samples from the test well to the laboratories for analysis, as required by the NDHHS. The village is currently awaiting the laboratory analysis results. If the results meet all state requirements, the well can be activated and begin providing water to the municipal water supply system.

5.2.1 History of Community Involvement

In July 2011, the running annual average concentration of carbon tetrachloride in groundwater from well PWS 70-1 (calculated on the basis of results of 4.01-6.87 µg/L from four groundwater sampling events in 2011) was found to be 5.24 µg/L, which exceeds the MCL of 5.0 µg/L. A notice of violation for the public water supply system was then issued by the NDHHS (2011). On January 16, 2012, the village of Eustis placed well PWS 70-1 on emergency backup/standby status (Village of Eustis 2012). With only one active well remaining in service, the village board then initiated efforts to site and construct an additional public well.

5.2.2 Key Community Concerns

Once the proposed Phase I investigation begins and the presence of Argonne staff and contractors becomes apparent, nearby residents are likely to become curious. This community relations plan is being developed in anticipation of the potential for greater community interest. Community concerns will be gauged during and after the site investigation and addressed appropriately, as needed.

5.3 Community Relations Objectives

The Eustis community relations plan has the following major objectives:

1. Explain the CCC/USDA's investigation plans and provide general information about the hazardous waste program.

2. Present the proposed Phase I investigation plan and activities to village officials and request permission to conduct the proposed activities, as required per village ordinances 317 and 318. Anticipated activities include direct-push boring with the CPT and some drilling.

3. Inform village officials, the current property owner of the former CCC/USDA facility, and other interested residents of the investigation's findings and developments.

4. Respond to residents' inquiries about site activities and the presence of health and environmental hazards.

5. Ensure that the public has appropriate access to technical information and contact individuals for involvement in site-related decisions.

6. Provide appropriate documentation and contact information to enable interested residents to learn about the site.

5.4 Timing of Community Relations Activities

This section describes the activities needed to meet the community relations objectives identified in Section 5.3. Many of these activities need to take place before the field work begins. Listed below are milestones and planned activities.

5.4.1 Activities before Field Work Begins

The CCC/USDA and Argonne will conduct the following community relations activities, to the extent practicable, before field work begins:

1. A point of contact will be designated for Argonne. The individual will be Argonne's liaison with village officials and interested residents.

2. Upon obtaining approval from the CCC/USDA, Argonne will make initial contact with local residents and officials of the village government to explain proposed activities and schedules.

3. Argonne will make arrangements to present and discuss the Phase I investigation plan to the village board and will request permission of the village board to allow drilling and associated activities in support of the site investigation within the village's designated wellhead protection area (Ordinance 318) and within specified distances of the public water supply wells (Ordinance 317).

4. Argonne will make arrangements to conduct discussions (by telephone and in person) with interested residents and any other affected parties, as appropriate, to address their concerns and information needs.

5. Upon completion and approval of this site-specific *Work Plan*, Argonne will provide a copy of the document to the village for public viewing by interested parties.

5.4.2 Activities during Field Work

The CCC/USDA and Argonne will provide for the conduct of the following community relations activities, to the extent practicable, during field work:

1. Meetings with interested residents and other parties when needed.

2. Preparation and distribution of fact sheets or letters to inform the community of the investigation's progress, significant milestones, or changes in plans.

3. Continued telephone contact with interested residents and with state and local officials.

4. Arrangements for site visits by interested parties, within allowable safety limitations.

5.4.3 Activities upon Completion of Field Work Activities

The CCC/USDA and Argonne will conduct the following community relations activities, to the extent practicable, upon completion of the field work:

1. If requested, arrange for a meeting with village officials and interested residents, as appropriate, to present and discuss the investigation's findings, results, and recommendations, as well as any future activities at the site.

2. Prepare and distribute printed information outlining the investigation's results and any future activities at the site, as appropriate.

3. Provide a copy of the final report that documents results of the investigation to the village for public viewing by interested parties.

5.5 Contact List of Key Officials

The contact list for use during Phase I work is below. The list includes key federal, state, local officials, and Argonne contacts.

Local Officials

Village of Eustis Office
106 N Morton St.
Eustis, NE 69028
villageofeustis@myusacomm.net
308-486-3661
308-486-2360 (fax)
Village Clerk: Susan Strong
Hours: Tuesday-Thursday, 9 a.m.-noon and 1-3:30 p.m.

Eustis Village Board
Jim Schmeeckle, Chairman
Brad Keller, Vice Chairman
Doug Banzhaf, Member
Andy Cochrane, Member
Randy Koch, Member

Village Water Operator
Michael Koch
308-486-4251 (shop)
308-785-7848 (cell)

Federal Agency Officials

Steve Gilmore
Conservation and Environmental Protection Division
Farm Service Agency
Commodity Credit Corporation
U.S. Department of Agriculture
Room 4725, Stop 0513, South Agriculture Building
1400 Independence Avenue, SW
Washington, DC 20250-0513
202-720-5104
Steve.Gilmore@usda.gov

State Agency Officials

Mike Felix
Remediation Section
Waste Management Division
Nebraska Department of Environmental Quality
Suite 400, The Atrium, 1200 N Street
P.O. Box 98922
Lincoln, NE 68509-8922
402-471-2938
402-471-2909 (fax)
mike.felix@nebraska.gov

Wade Gregson
Groundwater Geologist
Remediation Section
Waste Management Division,
Nebraska Department of Environmental Quality
Suite 400, The Atrium, 1200 N Street
P.O. Box 98922
Lincoln, NE 68509-8922
402-471-3377
402-471-2909 (fax)
wade.gregson@nebraska.gov

Argonne Contacts

Lorraine M. LaFreniere, Ph.D.
Manager, Applied Geosciences and Environmental Management Section
Environmental Science Division
9700 South Cass Avenue
Argonne, IL 60439-4843
630-252-7969
lafreniere@anl.gov

James Hansen
Community Relations Representative
Environmental Science Division
Argonne National Laboratory
955 L'Enfant Plaza SW, Suite 6000
Washington, DC 20024
202-488-2453
hansenj@anl.gov

Eugene Yan, Ph.D.
Eustis Project Manager
Environmental Science Division
9700 South Cass Avenue
Argonne, IL 60439-4843
630-252-6322
eyan@anl.gov

6 Health and Safety

The general health and safety plan for use during the work at Eustis is in Section 3 of the *Master Work Plan* (Argonne 2002). That document addresses all anticipated safety issues for the activities at the Eustis site. Specific emergency information for use at the site is in Table 6.1.

The village of Eustis has emergency 911 service. All emergency calls, including police, fire, and ambulance calls, will be directed for an appropriate response from this number. A local medical clinic (Plum Creek Medical Group) is located on East Railroad Street near Main Street. Major medical services are provided by Cozad Community Hospital in Cozad, Nebraska, approximately 16 mi north of Eustis. Driving directions to the hospital and a map showing the route are in Figure 6.1. Additional emergency information is in Table 6.1.

TABLE 6.1 Emergency information for the investigation at Eustis, Nebraska.[a]

Resource	Telephone Number	Name
All Emergencies	911	-
Hospital	308-784-2261	Cozad Community Hospital[b] 300 East 12th Street, Cozad, NE 69130
Medical Clinic Service	308-486-5440	Plum Creek Medical Group 106 East Railroad Street, Eustis, NE 69028
Fire Protection (nonemergency)	308-486-4951	Eustis Volunteer Fire Department 101 East Chandler Street, Eustis, NE 69028
Sheriff (nonemergency)	308-367-4411	Frontier County Sheriff 308 Center Avenue, Curtis, NE 69025
Industrial Hygiene	630-252-3310	Argonne-Industrial Hygiene
Safety	630-988-9706	EVS Division[c] Field Safety Coordinator (Monte Brandner)
Management	630-252-4878	EVS Division[c] Environmental, Safety, and Health Coordinator (Bill Gasper)
	630-252-7969	AGEM Program Manager (Lorraine LaFreniere)
	630-252-1275 630-408-7114	AGEM Field Project Manager (David Surgnier)
	630-252-6322	AGEM Technical Project Manager (Eugene Yan)
Security	630-252-5737 630-252-5731	Argonne-Operations Security (workdays) (after hours and weekends)
Poison Control	800-222-1222	Nebraska Regional Poison Center
Utilities Survey	800-331-5666	Diggers Hotline of Nebraska, Omaha, NE http://www.ne1call.com/

[a] Post this table in the field operations base.

[b] The route from Eustis to the Cozad Community Hospital is shown in Figure 6.1.

[c] Environmental Science Division at Argonne.

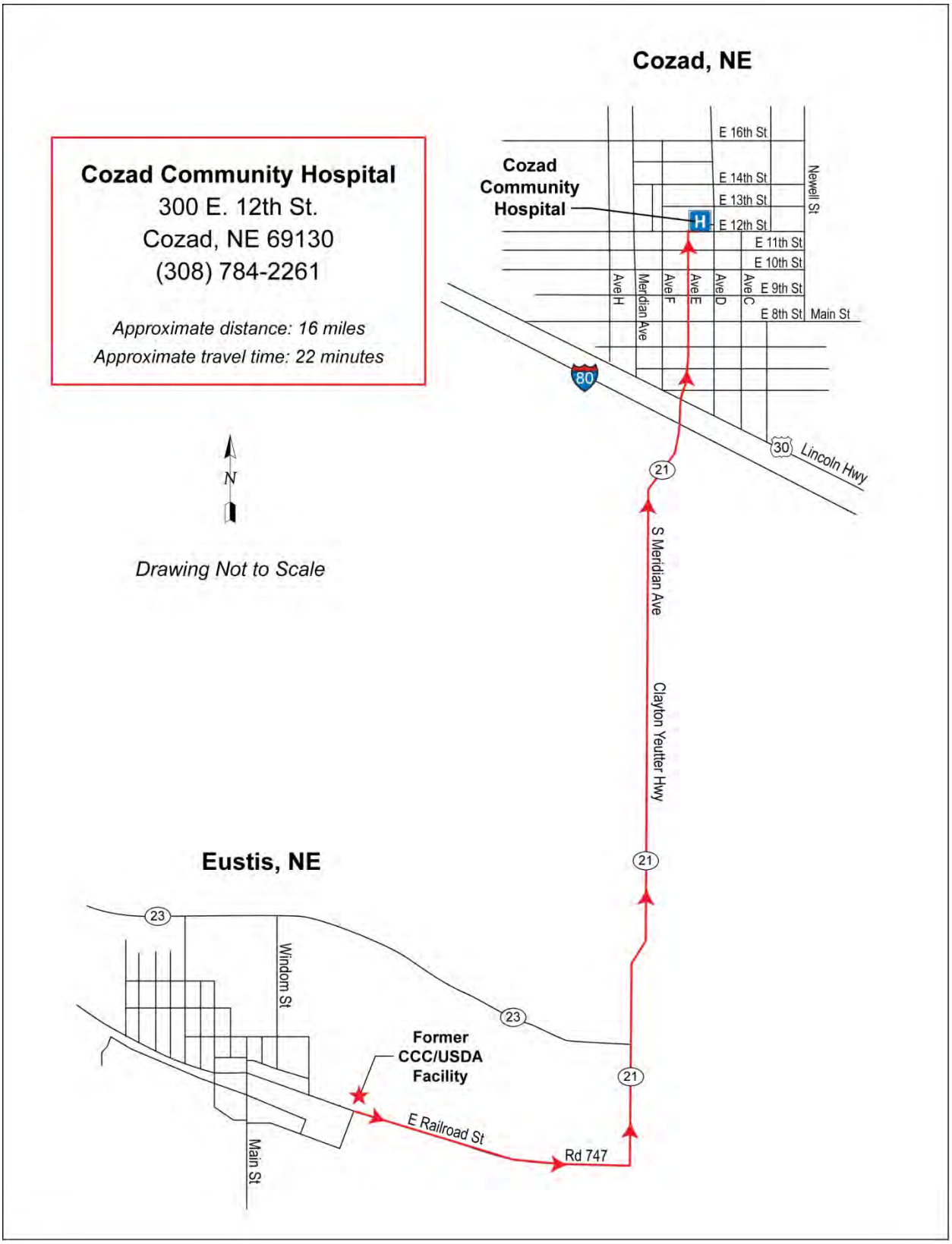

FIGURE 6.1 Emergency route from the Eustis site to the Cozad Community Hospital.

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Appendix A:

Nebraska Wellhead Protection Area Map for the Eustis Public Water Supply System and Data Used to Construct the Map

WhAEM Data Sheet

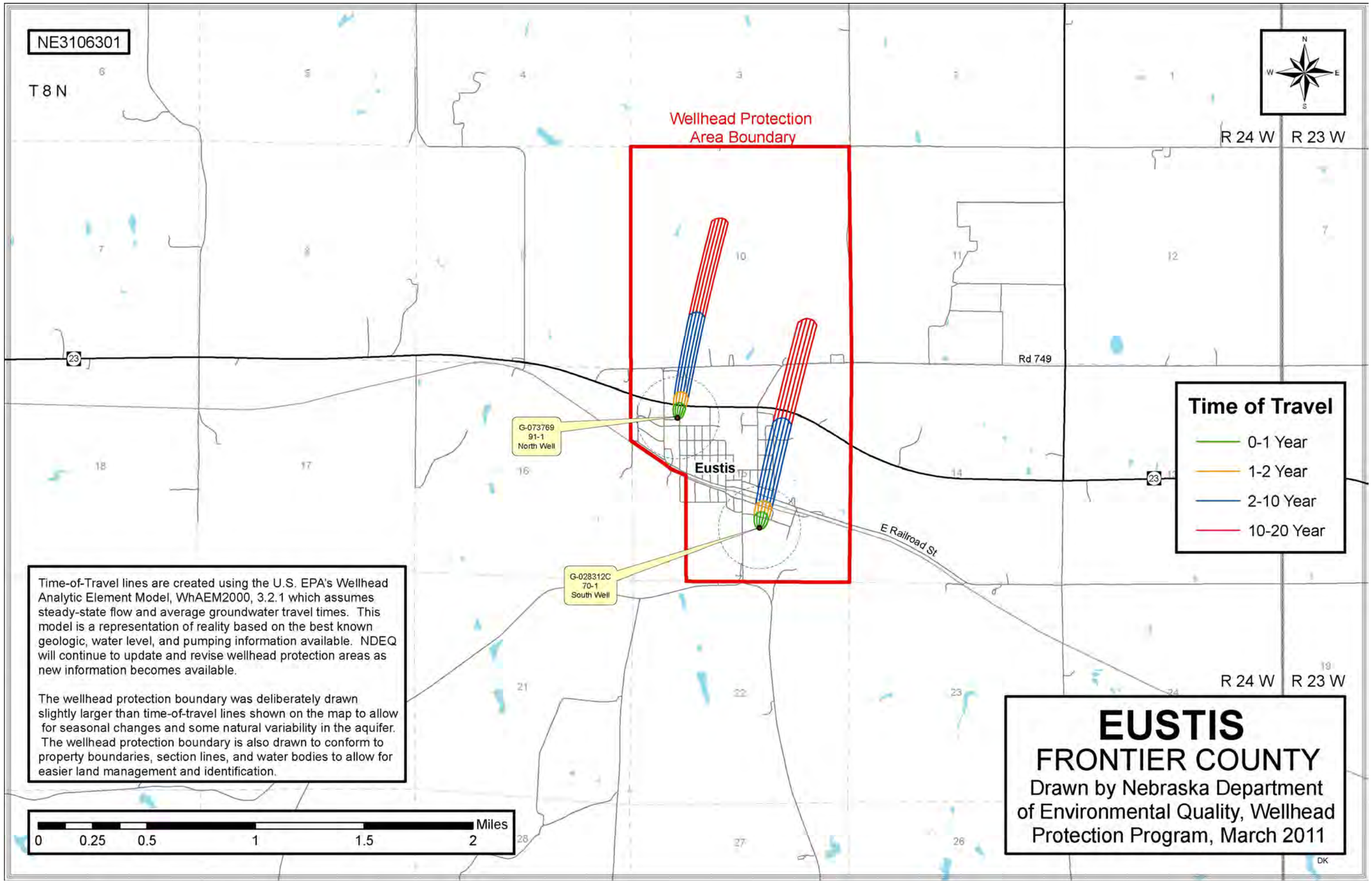
System Name	Village of Eustis				
PWS Wells					
Name	**HHS**	**DNR**	**Pump Rate (ft^3/day)**	**Radius (ft)**	**Base**
South Well	70-1	G-028712C	8160	1	2305
North Well	91-1	G-073769	6610	1	2291

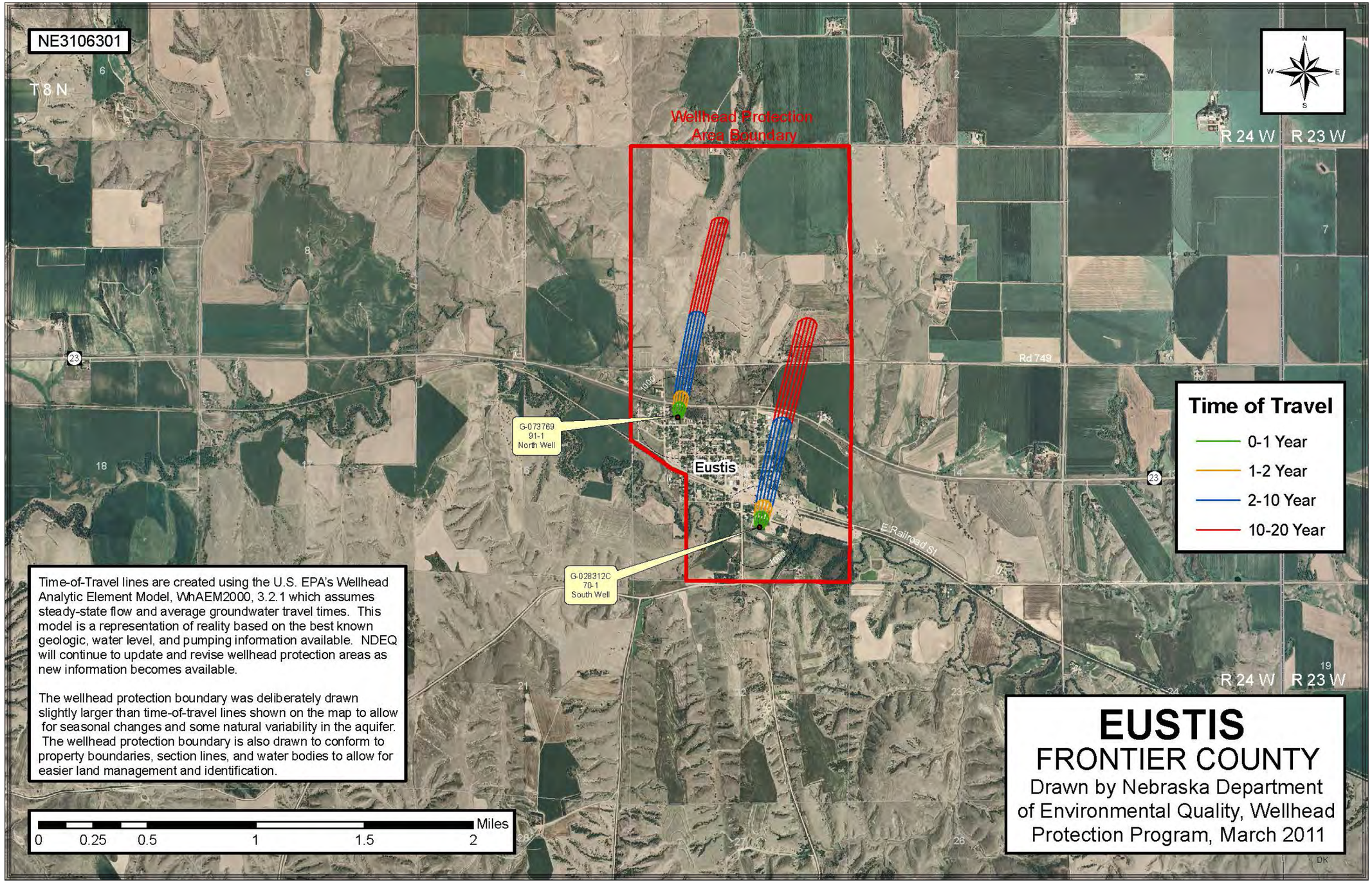
Conceptual Model:

Confined Ogallala sands and gravels. Groundwater flows to the south, away from the TriCounty Canal.

Head Specified Wells					
8N 24W 5BA 1	2472.04	G-110984	2532	G-129883	2485
8N 23W36CC 1	2500.4	G-107616	2555	G-074986	2530
8N 23W14AA 1	2523.04	G-105046	2574	A-006890	2514
8N 23W13CB 1	2518.91	G-124209	2514	G-100607	2440
7N 25W12ADA 1	2456.3	G-002035	2506	G-105883	2448
7N 24W 4DAC 1	2469.21	G-129530	2516.5	G-123640	2442
8N 23W 4CC 1	2513.19	G-148702	2499	G-082112	2510
9N 24W13CB 1	2545.49	G-031641	2507	G-099490	2444
9N 25W32BC 1	2544.99	G-095189	2491	G-148896	2451
9N 24W35DB 1	2540.71	G-127158	2480	G-037648	2468
9N 23W29CA 1	2542.63	G-027075	2498	G-095447	2471
9N 26W36ADDA1	2555.71	G-086051	2511	G-127695	2535
8N 23W25CC 1	2509.13	G-034607	2525	G-149224	2461
8N 23W13AA 1	2515.55	G-098165	2516	G-074972	2488
8N 23W11AA 1	2538.5	G-150720	2522	G-154012	2484
7N 23W 1DC 1	2393.89	G-030236	2528	G-123288	2530
8N 25W22BB 1	2512.71	G-032164	2528	G-138696	2546
7N 26W11BAB 1	2475.31	G-076524	2558	G-126467	2530
				G-106481	2530

Line Sink (river/lake)	Name		**Units**
	Platte River	2650-2430	feet
	Tri County Canal	2650-2607	feet
	Republican River	2410-2030	feet
Inhomogeneity	Conductivity		ft/day
NA	Recharge Rate		ft/day
	Porosity		
	Base Elevation		feet
	Average Head		feet
Aquifer	Base Elevation	2291	feet
	Thickness	140	feet
	K	54.2	ft/day
	Porosity	0.15	
	Iterations	4	


NE3106301
T 8 N
Wellhead Protection Area Boundary
R 24 W
R 23 W
Rd 749
E Railroad St
Eustis
G-073769
91-1
North Well
G-028312C
70-1
South Well
Time of Travel
0-1 Year
1-2 Year
2-10 Year
10-20 Year
Time-of-Travel lines are created using the U.S. EPA's Wellhead Analytic Element Model, WhAEM2000, 3.2.1 which assumes steady-state flow and average groundwater travel times. This model is a representation of reality based on the best known geologic, water level, and pumping information available. NDEQ will continue to update and revise wellhead protection areas as new information becomes available.
The wellhead protection boundary was deliberately drawn slightly larger than time-of-travel lines shown on the map to allow for seasonal changes and some natural variability in the aquifer. The wellhead protection boundary is also drawn to conform to property boundaries, section lines, and water bodies to allow for easier land management and identification.
Miles
0
0.25
0.5
1
1.5
2
EUSTIS
FRONTIER COUNTY
Drawn by Nebraska Department of Environmental Quality, Wellhead Protection Program, March 2011


NE3106301
T 8 N
R 24 W
R 23 W
Wellhead Protection Area Boundary
G-073769
91-1
North Well
G-028312C
70-1
South Well
Eustis
Rd 749
E Railroad St
Time of Travel
0-1 Year
1-2 Year
2-10 Year
10-20 Year
Time-of-Travel lines are created using the U.S. EPA's Wellhead Analytic Element Model, WhAEM2000, 3.2.1 which assumes steady-state flow and average groundwater travel times. This model is a representation of reality based on the best known geologic, water level, and pumping information available. NDEQ will continue to update and revise wellhead protection areas as new information becomes available.
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Miles
0 0.25 0.5 1 1.5 2
EUSTIS
FRONTIER COUNTY
Drawn by Nebraska Department of Environmental Quality, Wellhead Protection Program, March 2011

Appendix B:

Geologic Logs and Well Information for Private and Public Water Wells and State Test Holes Used in Construction of Hydrogeologic Cross Sections A-A' and B-B'

Appendix B:

Contents

TABLE B.1 Summary of geologic logs and well information for private wells, and public water supply wells, and state test holes used in construction of cross sections A-A' and B-B'

Logs Used for Section A-A':

22-H-78 (Test hole)
G-045760
G-127696
G-082112
PWS 91-1 (G-073769)
PWS 70-1 (G-28712C)
G-150792
G-155760
54-A-48 (Test hole)

Logs Used for Section B-B':

G-111296
PWS 91-1 (G-073769)
DH-5 (G-076059)
PWS 70-1 (G-28712C)
G-104890

TABLE B.1 Summary of geologic logs and well information for private wells, public water supply wells, and state test holes used in construction of cross sections A-A' and B-B'.

	Well Identification	Easting[a]	Northing[a]	Depth (ft BGL) Well Depth	Static Water Level	Screen Interval	Well Use	Date of Completion
A-A' (NW-ESE)								
1	22-H-78	-100.09427	40.68505	680[b]	175	–	Test hole	09/08/1978
2	G-045760	-100.08656	40.67825	560	227	Unknown	Irrigation	07/12/1975
3	G-127696	-100.06261	40.67472	270	133	190-270	Irrigation	05/04/2004
4	G-082112	-100.05089	40.67213	285	110	275-285	Livestock	06/15/1994
5	PWS 91-1 (G-073769)[c]	-100.03472	40.66711	383	147	270-280; 350-380	Municipal	04/25/1991
6	PWS 70-1 (G-28712C)[d]	-100.02772	40.65978	305	112	195-207; 281-305	Municipal	06/25/1970
7	G-150792	-100.00922	40.65631	205	90	195-205	Livestock	10/14/2008
8	G-155760	-99.98806	40.65586	218	112	208-218	Livestock	05/06/2010
9	54-A-48	-99.98037	40.65666	485.7[b]	191	–	Test hole	11/03/1948
B-B' (N-S)								
1	G-111296	-100.03587	40.67014	300	150	280-300	Domestic	08/13/1985
2	PWS 91-1 (G-073769)	-100.03472	40.66711	383	147	270-280; 350-380	Municipal	04/25/1991
3	DH-5 (G-076059)	-100.02906	40.66233	113.4	105.34	98-113	Monitoring (plugged)	09/16/1991[e]
4	PWS 70-1 (G-28712C)	-100.02772	40.65978	305	112	195-207; 281-305	Municipal	06/25/1970
5	G-104890	-100.02739	40.64754	302	160	292-302	Domestic	11/15/1999

[a] Sources of coordinates: Private water wells, Nebraska Department Natural Resources (http://dnrdata.dnr.ne.gov/wellscs/Menu.aspx); Eustis public water supply wells, estimated by Argonne; test holes, Nebraska statewide test hole database (http://snr.unl.edu/data/geologysoils/NebraskaTestHole/NebraskaTestHoleIntro.asp).

[b] Depth of the borehole of the test hole; no well was installed at this location.

[c] In addition to the Nebraska water well registration form (DWR 602), additional information and lithology below the well depth are based on an engineering design drawing by T.C. Engineering, Co. (1990), North Platte, Nebraska.

[d] In addition to the Nebraska water well registration form (DWR 602), additional information and lithology below the well depth are based on an engineering design drawing by Mousel & Wright Consulting Engineers (1970), McCook, Nebraska.

[e] The monitoring well was pugged on 12/01/2005.

Logs Used for Section A-A'

08N 24W 06BBBB 22-H-78

Test Hole #22-H-78 (E-log)
(8-24-6bbbb)
Frontier County

Location: NW NW NW NW sec. 6, T. 8 N., R. 24 W., 194 ft. south and 222 ft. east of northwest corner.
Ground elevation: 2,700 ft. (t) (Eustis 7.5 minute quadrangle)
Depth to water: 175 ft. (est.) (9-8-78)

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Sand, moderately-very silty, possibly old road fill, brown	0.0	5.0
Silt, slightly-moderately clayey, gray brown-dark gray brown	5.0	20.0
Silt, slightly clayey, very coarse silt, sandier 32-38 ft., limy streaks, trace manganese staining, yellow brown-pale yellow brown, light gray paleosol 24-26 ft	20.0	86.0
Silt, slightly clayey, trace very fine sand, reddish brown	86.0	90.0
Silt, slightly clayey, fine-very coarse silt, trace very fine sand, limy streaks, trace lime concentrations, yellow-brown-pale yellow brown	90.0	160.0
Silt, moderately-very clayey, yellow brown	160.0	164.0
Silt, slightly clayey, fine-coarse silt, yellow brown	164.0	174.0
Silt, very coarse silt, trace very fine sand, manganese and iron stains, light grayish brown-light gray	174.0	198.0
Silt, very coarse silt, trace very fine sand, manganese and iron stains, light grayish brown-light gray	198.0	201.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, coarse-very coarse silt, trace very fine sand, moderately limy, light gray-pale brown	201.0	232.0
Silt, slightly clayey, some very fine sand, slightly to moderately limy, light gray-pale brown-white with some dark greenish brown silts	232.0	246.0
Sand-sandstone, very fine-fine, trace medium-very coarse, moderately limy, moderately silty, light gray-light green-pale brown	246.0	268.0
Sand, very fine-fine, slightly silty, pale brown	268.0	276.0
Silt, slightly clayey, moderately-very sandy, very fine-fine sand, green gray	276.0	281.0
Silt, trace very fine sand, trace siltstone, very limy-lime cemented, very pale brown-grayish white	281.0	286.0
Sand, very fine-medium, some coarse-very coarse, trace fine gravel, lime cemented, light grayish brown	286.0	290.0

Sand, very fine sand, trace sandstone, moderately-very silty, very limy, light gray-pale brown.....	290.0	294.0
Sand, fine-very coarse, trace fine gravel, trace lime cement, pale brown.....	294.0	301.0
Silt, very sandy, very fine-fine sand, limy, light gray-pale brown.....	301.0	306.0
Sand, very sandy, very fine-fine sand, limy, light gray green.....	306.0	309.0
Silt, moderately-very clayey, trace very fine sand..	309.0	324.0
Sand and gravel, fine sand-fine gravel, much very coarse sand-fine gravel.....	324.0	339.0
Silt, very coarse, some very fine sand, yellow brown	339.0	341.0
Sand, fine-medium, trace coarse sand-fine gravel, slightly limy in streaks, trace iron and manganese staining, yellow brown.....	341.0	349.0
Silt, some sandstone and siltstone seams, moderately to very clayey, slightly sandy, very fine-fine sand, moderately-very limy, grayish brown-white...	349.0	368.0
Sand-sandstone, very fine-medium, rootlets, slightly limy in streaks, trace iron and manganese stains, yellow brown.....	368.0	395.0
Silt, moderately-very sandy, very fine sand, limy, light grayish white.....	395.0	404.0
Silt, moderately-very sandy, slightly limy, gray green.....	404.0	414.0
Sand and sandstone, very fine-fine sand, slightly to moderately silty, slightly limy, rootlets, light gray green.....	414.0	430.0
Silt-siltstone, moderately sandy, very fine-medium sand, very limy, light green white.....	430.0	433.0
Sand, very fine-fine, trace medium-coarse sand, trace rootlets, light gray green, very silty at 464 ft.....	433.0	466.0
Limestone-siltstone, manganese stains, very hard, very limy, white.....	466.0	474.0
Sand-sandstone, interbedded with silty, clayey-claystone seams, sand is very fine-medium, moderately-very silty, slightly moderately limy, light greenish gray.....	474.0	512.0
Sand and gravel, very fine sand-medium gravel, much coarse sand-fine gravel.....	512.0	521.0
Silt, very sandy with limy siltstone, light gray....	521.0	524.0
Sand, very fine-very coarse, much medium, slightly silty.....	524.0	530.0
Silt, very limy, slightly sandy, very fine medium sand, very clayey at 543 ft., light gray.....	530.0	564.0
Sand-sandstone, very fine-medium, slightly-moderate silty and limy, trace rootlets, light gray.....	564.0	578.0
Silt, moderately-very clayey, slightly-moderately silty, slightly limy, light gray, green pale brown.....	578.0	607.0
Sand, very fine-coarse, much fine-medium.....	607.0	610.0

Silt, moderately clayey, slightly sandy, light gray-pale brown.....	610.0	616.0
Sand and gravel, very fine-very coarse sand, some fine gravel.....	616.0	638.0
Silt, moderately-very clayey, gray white, sandy at 640-642 ft. and 645-649 ft., traces of reworked weathered clay and flint.....	638.0	651.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Chalk, very calcareous white to 660 ft., iron staining and white-light yellow 660-678 ft.....	651.0	678.0
Chalky, shale, light gray-tan with iron stains.....	678.0	680.0

Revised April 1961
Irr. 67-1

1

Registration No. G-45760 County of Frontier Date Filed August 1, 1975

STATE OF NEBRASKA
IRRIGATION WELL REGISTRATION

I, Leo Bartruff (Name of Person registering well) of Eustis (Postoffice Address)

County of FRONTIER State of Nebraska, do hereby certify:

1st. That the name of the owner of the land upon which the irrigation well is located is Leo Bartruff, of R.R. 1 Street, Eustis (City or Village) County of FRONTIER State of NEBR.

2nd. That the irrigation well is located on the SW Quarter of the NW Quarter of Section 7 Township 8, Range 25 of the Sixth P. M., FRONTIER County, and is 234 feet from the south line and 1320 feet from the west line of said tract.

3rd. That the well was installed with the intention of irrigating all or parts of the following described land: SW and SE 1/4 Sec 7 Twp 8 Rng 25 (Give Quarter, Section, Township and Range)

amounting in all to approximately 320 acres.

(If installation consists of a battery of wells with one outlet, give details on a sheet to be attached hereto.)

4th. That the capacity of said well under normal operating conditions is 1200 gallons per minute.

5th. That the depth of the well is 560 feet, measured from the surface of the ground.

6th. That the inside diameter of the casing is 16 inches.

7th. That the static water level in the well is 227 feet below ground surface.

8th. That the depth to water under normal pumping conditions is 247 (Pumping Level) feet below ground surface.

9th. That the diameter of the pump column is 8 inches. That the diameter of the 1-5stage (Give number of bowls) bowl or bowls is 12 inches.

10th. That the type and size of impeller is as follows:
Open port bronze impellers

11th. That the well was completed on or about the 11th day of July, 19 75

Revised April 1941
Irr. 57-2

1

12th. That attached hereto are three copies of the log of the well certified to by the driller of the well.

13th. That the driller of this well is [illegible], whose address is [illegible]

14th. That the name of the tenant or operator, if other than the owner, is ..... whose address is .....

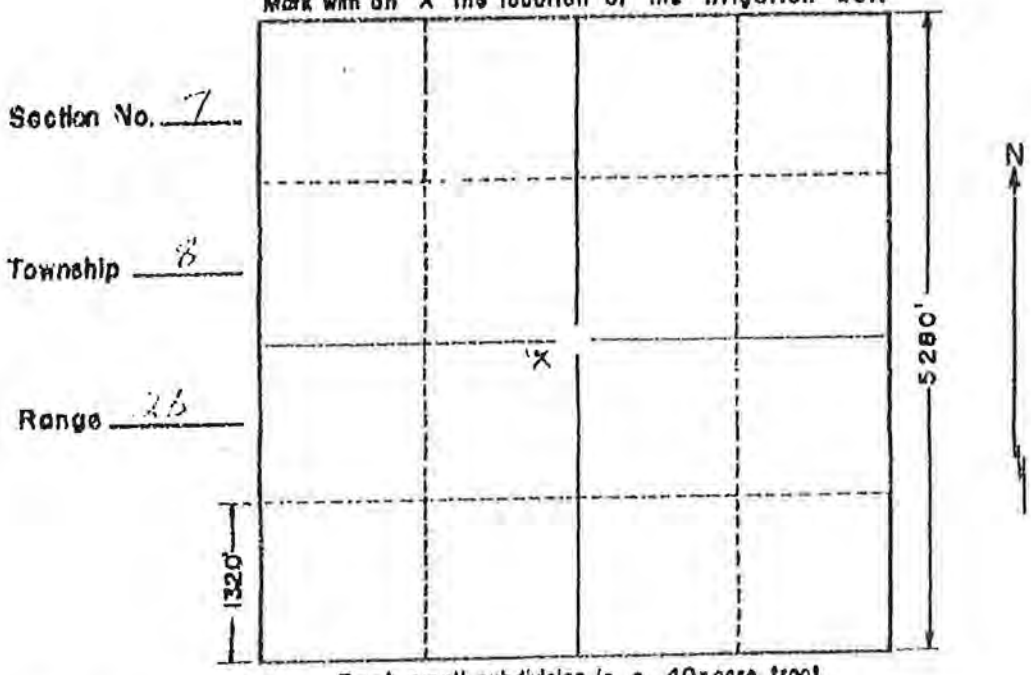
15th. That the relation which the subscriber to this instrument bears to said registrant is that of [illegible]
(State whether owner, tenant or agent for land on which well is located)

and that he is authorized to sign this instrument in behalf of the interest affected.

Signed: [illegible]

Dated: July 22 1973

This drawing represents one Section
Mark with an "X" the location of the irrigation well



Each small subdivision is a 40-acre tract.

State of Nebraska
Department of Water Resources } ss.

This instrument was filed for record at 10 o'clock A.M., on the 1st day of August 19 75

[illegible]
Director of Water Resources

1

Revised April 1, 1969
Dr. 67-1

Registration No. G-45760 County of Frontier Date Filed August 1, 1975

STATE OF NEBRASKA
CERTIFICATE OF WELL DRILLER

I, Leo Bartruff (Name of Driller) of Rural Route 1 Curtis (Postoffice Address)

County of Frontier State of Nebraska, do hereby certify that:

1. I am the driller of a well located on the Southwest Quarter, Section No. 7

Township 6 North, Range 25, owned by Leo Bartruff

whose postoffice address is Rural Route 1 Curtis State of Nebraska

2. That the drilling was begun on the 3 day of July, 19 75, and completed on

the 5 day of July, 1975

3. That the well is cased and screened in the following manner: Well 500 ft. 8 gage 16" .219 (Give kind of casing, lengths and position of plain and screen casing, weight of metallic casing, etc.)

wood wall casing 260 ft. next 280 ft. plain

4. That the diameter of drilled hole is 8 inches.

5. That reverse circulation type of drilling machinery was used.

6. That the drilled hole is/is not sealed, as follows: is not sealed

7. That the following is an accurate log of the depth, thickness and character of the different strata penetrated, and the location of water-bearing strata:

DEPTH IN FEET FROM	TO	MATERIAL DRILLED
0	220	Top soil sandy clay
220	240	Clay small layers sand
240	251	Clay sand mixed
251	260	Coarse sand clay layers large fine gravel
260	272	Coarse sand sandstone clay (Mixed)
272	280	Coarse sand sandstone layers fine gravel
280	289	Fine gravel
289	293	Coarse sand rock
293	500	Coarse sand fine gravel (Feldspar)

Date Signed July 19 75 Leo Bartruff (Name)

(If more space is required please use reverse side of this page.)

500	509	Fine to medium gravel
509	511	Clay
511	520	Coarse sand rag; clay layers
520	527	Coarse sand sandyn clay layers
527	532	Clay
532	540	Coarse sand
540	560	Friable sandstone and coarse sand (Quartz) small layers clay
560	567	Coarse sand clay (Mixed) small layers slip clay
567	400	Coarse sand clay (Mixed) trace silt clay
400	405	Coarse sand fine gravel
405	408	Clay
408	420	Coarse sand fine gravel clay layers
420	425	Coarse sand clay layers (small)
425	435	Coarse sand fine gravel
435	440	Clay (Drilled Hard)
440	445	Clay sag (Drilled Hard)
445	460	Coarse sand fine gravel
460	480	Coarse sand
480	500	Coarse sand small layers clay and rag
500	520	Coarse sand trace fine gravel
520	530	Coarse sand fine gravel
530	539	Hard rag
539	540	Coarse sand
540	551	Fine gravel
551	553	Clay
553	560	Fine gravel small clay
560	580	Fine sand rag layers
580+	0..	Fine to medium sand clay layers

STATE OF NEBRASKA
DEPARTMENT OF NATURAL RESOURCES
WATER WELL REGISTRATION

Fee Paid	$110.00	DNR Cash Fund	$18.50
HHSS Fee	$70.00	HHSS-DNR Cash Fun	$0.00
GetBilling	6693		

FOR DEPARTMENT USE ONLY

NOL ID	108577499014913	NOL Status	Accepted	Well Status	A	Registration Code	G-127696
Owner ID	65147	NOL Date	06/04/2004	Call Up Code		Registration Date	06/04/2004
Seq Num	153012			Call Up Date			

Add Print

06042004 - 153012 -WWRF

1a Owner's Name: PHOEBE/LEO BARTRUFF FMLY TRST
b Company Name:
c Correspondent Name: STUART BARTRUFF Attention Name:
Address: 3200 EDWARD COURT
City: LINCOLN State: NE Zip Code: 68502 - 5219 Phone: 402 - 488-8489

2a HHSS Contractor Lic ID: 297652 Contractor's Name: Jeffrey B. Remmenga
Contractor's License No: 39384 Contractor's Email Address: remmengadrilling@yahoo.com
b Drilling Firm Name: Remmenga Drilling Company
Address: RR 1 Box 2
City: Elwood State: NE Zip Code: 68937 Phone: 308 - 785-2290
Drilling Firms Email Address:

3a Well Location: NWSE of Section: 8 Township: 8 North, Range: 24 W (E/W), Frontier County
b Natural Resource District: Central Platte
c The well is: feet from the (N/S) section line and feet from the (E/W) section line
GPS: or Latitude: 40 40' 29.00" Longitude: -100 03' 45.40"
d Street address or block, lot and subdivision, if applicable: Block No: Lot:
e Location of water use, if applicable (give legal descriptions): SE 8-8-24W
f If for irrigation, the land to be irrigated is: 120 Acres
g Well Reference letter(s), if applicable:

4 Permits

	Permits Number	Date		Permits Number	Date
Management Area Permit	CP3203002	10/08/2003	Transfer Out-Of-State		
Surface Water			Well Spacing		
Geothermal			Conduct Water		
Industrial			Municipal		
Industrial Transfer Notice			Other		

5 Purpose of Well: Irrigation Other:
Notes:

6 Wells in a Series
a Is this well a part of a series? ☐
b If one or more of the wells in the series is currently registered, give the well registration number:
c How many wells in the series are you registering at this time?

7 Replacement and abandoned well information Replacement Number:
a Is this well a replacement well? ☐
b Registration number of abandoned well:
If not registered, date abandoned well was constructed:
c Replacement well is: feet from abandoned well.
d Abandoned well last operated:

06042004 - 153012 -WWRF

e Original well pump column size: [ ] inches. f Completion of original well abandonment on [ ]

g Location of water use of abandoned well [ ]

8 Pump Information

a Is pump installed at this time? [✓]

Is pump installed by well owner in section 1? [ ] Is pump installed by contractor in section 2? [✓]

Else installed by pump installer.

b HHSS Installer's License ID. 297652

Pump Installer's License No. 39384 Pump Installer's Name Jeffrey B. Remmenga

Pump Installer's Email Address

Pump Installer's Firm Name Remmenga Drilling Company

Pump Installer's Firm Address RR 1 Box 2

City: Elwood State NE Zip Code 68937-0000 Phone 308 - 785-2290

Pump Installer's Firm Email Address

c Pumping Rate 750 gallons per minute E measured or estimated

d Drop pipe diameter 6 inches e Length of drop pipe 220. feet.

f Pumping equipment installed 05 / 26 / 2004 g Pump Brand FLOWSERVE

h This well will be used to pump less than 50 gpm [ ]

9 Well Construction Information

a Total well depth 270. feet. b Static Water Level 133. feet.

c Pumping Water Level 190. feet. d Well construction began: 05 / 04 / 2004

e Well construction completed: 05 / 04 / 2004 f Bore hole diameter in inches. Top 28. Bottom 28.

g Casing and Screen Joints Glued Other

10 Well Construction (Casing and Screen)

From Depth	To Depth	Inside Diam	Outside Diam	Thickness	Screen Slot Size	Material	Trade name	Ga
0	190	14.768	16.000	.616		PVC	CERTAINTEE	
190	270	14.768	16.000	.616	.050	PVC	CERTAINTEE	

11 Well Construction (Grout and Gravel)

NOL ID	From Depth	To Depth	Material	
10857749901	0	13	CLAY	1
10857749901	13	270	3A	2

12 Geolog Material Logged

NOL ID	From Depth	To Depth	Description
10857749901	0	138	TOPSOIL & CLAY
10857749901	138	182	SANDY CLAY, SOME FINE SAND
10857749901	182	191	SANDST., CLAY, TR LIME
10857749901	191	199	GOOD SAND, SM.GRAVEL
10857749901	199	222	SANDST., CLAY & LIME
10857749901	222	230	GOOD SAND, SM.TO SOME MED.GRAVEL
10857749901	230	245	SANDST., CLAY & LIME
10857749901	245	254	CLAY, LIME & SANDST.
10857749901	254	260	GOOD SAND TO SM.GRAVEL
10857749901	260	264	GOOD SAND, SM.GRAVEL
10857749901	264	270	GOOD SANDST., TR CLAY

DWR Form 131

STATE OF NEBRASKA
DEPARTMENT OF WATER RESOURCES
WATER WELL REGISTRATION

INSTRUCTIONS

To register a ground water well, forward the following to the Department of Water Resources, P.O. Box 94676, Lincoln, Nebraska 68509-4676. Telephone number: 402/471-2363:

1. Water Well Registration form (DWR Form 131).
2. The most recent United States Department of Agriculture aerial photograph(s), available at the county Agricultural Stabilization and Conservation Service, marked to show the following:
   a) The location of the well to be registered.
   b) The location of wells owned by you in the same section. Each well should be labeled to show the use of water and the registration number. Abandoned wells should be shown, also.
   c) If the well is for irrigation, the land to be irrigated should be shown by a crosshatch pattern and the number of acres irrigated from the well should be indicated.
3. Fees: * For monitoring and observation wells --- $60.
   * For wells which pump less than 50 gallons per minute --- $60.*
   * For wells which pump 50 gallons per minute or more --- $100.*

* For wells permitted pursuant to the Industrial Ground Water Regulatory Act, a separate registration fee is required for each of the first ten wells registered under the permit. For each additional group of ten or fewer wells registered under the permit only one registration fee is required.

For Department Use Only

Registration Number: G-82112
Registration Date: 8/8/94
Receipt Number: 78549
22 - Middle Republican NRD
#91323

1. Name of well owner Wayne Keller Telephone Number (308) 456 4721
   Address RR, Box 78A
   City Eustis State NE Zip Code 69028

(16667)

2. Drilling Firm Remmenga Drilling Telephone Number (308) 785-2290
   Address R.R.1 Box 2 Contractor's License No. 39179 Pump Installer License No. 69140
   City Elwood State NE Zip Code 68937
   Well Logger (Name) Jeffrey Remmenga Well Driller (Name) Jeffrey Remmenga

3. Permit Number(s) NA

4. This well will be for (Indicate one): ___Irrigation ___Industrial Use ___Public Water Supply ___Domestic X Livestock ___Recovery ___Injection ___Observation (Ground Water Levels) ___Monitoring (Ground Water Quality) ___Dewatering (over 90 days) ___Other ___ (Indicate use)

5. Replacement and abandoned well information (Notice of abandonment procedure is required for all abandoned, registered wells.):
   A. Is this well a replacement well? X Yes ___No B. Registration number of abandoned well: Not Registered
   C. Replacement well is 60 feet from abandoned well. D. Abandoned well last operated ___, 1993
   E. Original well pump column size: ___ inches. F. Abandoned well plugged ___, 19___

6. A. Well location: SE ¼ SW ¼ of Section 9, Township 8 North, Range 34 ~~East~~/West, Frontier County.
   B. The well is 500 feet from the ~~North~~/South section line and 1900 feet from the ~~East~~/West section line. (If possible, measurements should be from nearest section line.) (500N 1900 E)
   C. Street address or block, lot and subdivision, if applicable: ___
   D. Location of use (give legal description): 8 - 5 - 24
   E. If for irrigation, the land to be irrigated is ___ acres.

printed on recycled paper

7. Pump Information. If a timed pump test was conducted, submit complete pumping and drawdown data including observation wells, if any, on separate page.
   A. Pumping rate: 18 gallons per minute. Measured ☐ or Estimated ☑
   B. Pump: Column diameter: _____ inches. C. Depth to pump: _____
   D. Pumping equipment installed: _____, 19____. E. Brand/Type: _____

8. Well Information.
   A. Total well depth: 285 feet. B. Static water level: 110 feet. C. Pumping water level 132
   D. Construction began: June 15, 1994. E. Construction completed: June 15, 199
   F. Bore hole diameter 9 inches.
   G. Casing: Diameter _____ ID 4 OD in.; Type of material: PVC
   Wall thickness Sch 40 - 200 psi in. Joints--Welded/Glued/Threaded/Other: glued; Guides at 285
   Length(s) and placement(s) depth from 0 ft. to 275 ft. from _____ ft. to _____
   H. Screen: _____ ID 4 OD in.; Type of material PVC
   Screen openings (slot size): .010; Trade name: Titan; Guides at _____
   Length(s) and placement(s) depth from 275 ft. to 285 ft. from _____ ft. to _____
   I. Gravel pack interval(s) from 10 ft. to 285 ft. from 245 ft. to 285 ft. Grade size: concrete
   J. Grouted/Sealed from 0 ft. to 10 ft., with Bentonite (type)
   from 235 ft. to 245 ft., with BENTONITE (type)
   K. Drilling method: Mud rotary L. Drilling fluid: water
   M. Well development technique (total time and method): pumped with submersible pump 2 hrs.
   N. Will chemicals or fertilizer be injected into the distribution system? ___Yes X No

GEOLOGIC MATERIALS LOGGED

DEPTH IN FEET FROM	TO	DESCRIPTION	DEPTH IN FEET FROM	TO	DESCRIPTION
0	105	topsoil & clay	260	272	sandstone clay & lime
105	214	clay, lime strks & fine sand	272	285	good sand & sandstone
214	216	gravel			
216	235	sandstone clay & lime			
235	237	gravel			
237	241	clay lime & sandstone			
241	244	sand & gravel			
244	256	sandstone clay & lime			
256	260	sand gravel clay & lime			

(Additional sheets may be submitted)

I am familiar with the information submitted on this registration, and to the best of my knowledge it is true.

Remmenga Drilling Co.

Robert R. Remmenga — Water Well Contractor's Signature — 6-25-94 Date

Wayne Kelker — Water Well Owner's Signature — 6-25-94 Date

Revised November 1987
DWR Form 602

STATE OF NEBRASKA
DEPARTMENT OF WATER RESOURCES
WELL REGISTRATION

A ground water well will be registered when the following are completed and received together by the Department:
1. Well Registration Form (DWR Form 602) ✓
2. Certificate of Well Driller (DWR Form 603) ✓
3. A $20.00 fee (payable to the Director of Water Resources) except when registering:
   a) a replacement well. A replacement well shall mean a well which replaces a registered abandoned well that was last operated in the past five years and is within six hundred feet of said abandoned well; or,
   b) well(s) permitted under the Municipal and Rural Domestic Transfers Permit Act.
4. The most recent United States Department of Agriculture aerial photograph(s), available at the county Agricultural Stabilization and Conservation Service, marked to show the following:
   a) The location of the well to be registered.
   b) The location of wells owned by you in the same section. Each well should be labeled to show the use of water and the registration number. Abandoned wells should be shown also.
   c) If the well is for irrigation, the land to be irrigated should be shown by a crosshatch pattern and the number of acres irrigated from the well should be indicated.

For Department Use Only

Registration Number: G-73769
Registration Date: 6/17/91
Receipt Number: 72441
NRD: 22 - Middle Republican

1. Name of well owner Village of Eustis Telephone Number (308) 486 3661
   Address Box 249
   City Eustis State NE Zip Code 69028 (68530)
2. Name of well driller Remmenga Drilling Telephone Number (308) 285-2290
   Address Contractor's License Number 39179
   City Elwood, NE State Zip Code 68937
3. Ground Water Control or Management Area Permit Number Middle Republican - Not Controlled.
4. Ground water withdrawn from this well will be for (Indicate one)
   ___ Irrigation X Municipal use ___ Industrial use ___ Other ___ (Indicate use)
5. Replacement and abandoned well information:
   A. Is this well a replacement well? ___ Yes X No
   B. Give the registration number of the abandoned well: ___
   C. The replacement well is ___ feet from the abandoned well.
   D. The abandoned well was last operated ___, 19___.
6. Well and pump information:
   A. Pumping rate under normal conditions: 700 gallons a minute.
   B. Total well depth: 385 feet.
   C. Pump column: Diameter: 8 inches. Length: 240 feet.
   D. Will chemicals or fertilizer be injected into the distribution system? ___ Yes X No
   E. The well was completed: 4-25, 19 91.
7. A. Well location: SW ¼ of the NW ¼ of Section 15, Township 8 North, Range 24 East/West, Frontier County. 1970S 1300E
   B. The well is 1970 feet from the North/South section line and 1300 feet from the East/West section line.
   C. If for irrigation, the land to be irrigated is NA acres in the following legal description: ___

I am familiar with the information submitted on this registration, and to the best of my knowledge it is true.

X 6-13-91
Date

X Alan D Wolf Chairman Village Board
Well Owner's Signature

Forward to:

State of Nebraska
Department of Water Resources
301 Centennial Mall South
P.O. Box 94676
Lincoln, Nebraska 68509-4676
(402) 471-2363

STATE OF NEBRASKA
DEPARTMENT OF WATER RESOURCES
CERTIFICATE OF WELL DRILLER

Revised 1985
DWR Form 603

For Department Use Only

Registration Number: G-73769

Registration Date: 6/17/91

Receipt Number: 72441

NRD: 22 - Middle Republican

1. Name and address of well driller: Remnenga Drilling Co.
R.R.1 Box 2
Elwood, Ne. 68937

Zip Code _____ Telephone (___) _____

2. Name and address of well owner:
Village of Eustis
Eustis, Nebr.

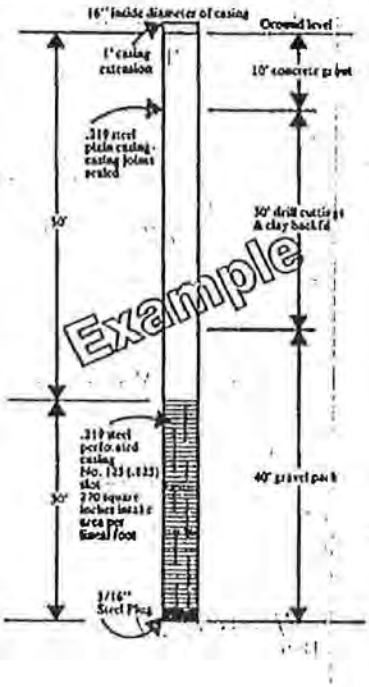
Zip Code 69028 Telephone (402) 486-3661

3. Permit Number: NA
(If applicable)

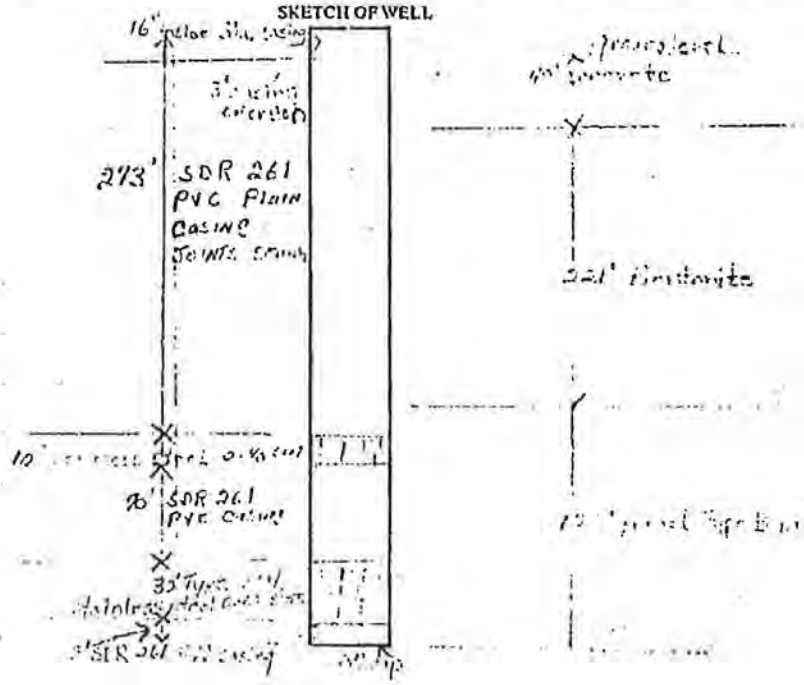
4. Well location: SW 1/4 of the NW 1/4 of Section 15, Township 8 North, Range 24 ~~East~~/West, Frontier County.
The well is 1920 feet from the north (North/South) section line and 1300 feet from the west (East/West) section line.

5. Well and pumping information: (If a timed pump test was conducted, submit complete pumping and drawdown data on separate sheet of paper.)
   A. Construction began: 4-24, 1991.
   B. Construction completed: 4-25, 1991.
   C. Drilled hole diameter: 30 inches.
   D. Static water level: 147 feet.
   E. Pumping level expected under normal operating conditions: 214 feet.

6. Indicate on the SKETCH OF WELL the location of the plain casing and screen segments. Give the lengths of the segments in feet. Also, identify the size, weight, type and inside diameter of segments; where the hole is sealed and backfilled and the type of seal(s) and backfill used.



SKETCH OF WELL



DRILLING LOG

DEPTH IN FEET FROM	TO	MATERIAL DRILLED	DEPTH IN FEET FROM	TO	MATERIAL DRILLED
0	20	topsoil & clay			
20	102	clay			
102	130	fine sand, layers & clay			
130	170	sandy clay w/lime strks			
170	208	sandy clay w/lime layers			
208	215	clay, lime strks, some sand & gravel			
215	220	some sand, gravel, sandstone & clay			
220	224	good sandstone, tr of gr, some clay			
224	236	sandstone, clay & lime			
236	240	fine to med sand & clay			
240	245	good sand, sm to med gr., s/clay layers			
245	255	clay, lime tr of gravel			
255	262	good sand to sm gr. s/clay, lime strks.			
262	265	clay, lime, sandstone			
265	279	good sand, med gravel			
279	281	clay, lime & gravel			
281	284	good sand, sm to med gravel s/clay			
284	304	sandstone, clay & lime			
304	315	sandstone, clay, lime s/good sand			
315	334	fine sand, sandstone, some clay & lime			
334	336	lime, not to hard			
336	340	good sandstone, clay layers, lime strks.			
340	345	good sandstone, med sand tr of clay			
345	350	med to good sand			
350	358	good sand sm gravel			
358	366	clay, lime and sandstone			
366	370	clay & mostly lime			
370	380	good sandstone, lime layers tr of gravel			
380	383	fine sand & sandstone			

Remmenga Drilling Co.

Robert B. Remmenga
Well Driller's Signature

4-29-91
Date

August 23, 1984

G-28712C
MUNICIPAL

Village of Eustis
P. O. Box 249
Eustis, Nebraska 69028

Dear Sirs:

Registration forms for a municipal well connected to previously registered wells were filed in this office on August 23, 1984. This new well is located in the SW¼SE¼ of Section 15, Township 8, Range 24 West, Frontier County and is identified as G-28712C (Municipal). The new well creates a series of three wells.

This letter is your official record of this registration.

Sincerely,

DEPARTMENT OF WATER RESOURCES

Susie Cotton
Staff Assistant
Ground Water Section

SC:jm

Revised December, 1978 DWR Form 602

DO NOT WRITE IN THIS SPACE

(MUNICIPAL) Registration No. G-28712C County Frontier Date Filed 8/23/84 1

STATE OF NEBRASKA
DEPARTMENT OF WATER RESOURCES
WELL REGISTRATION

1. General information:
   A. Connected well
      Is this well connected to another well? [X] Yes [ ] No G28712-A&B
      If yes, give registration number of previously registered well
      (If new installation consists of a series of wells with one outlet, complete registration forms and driller's certificates for each and submit $7.50)
   B. Replacement well
      Is this well to replace a permanently abandoned well? [ ] Yes [X] No
      If yes, give registration number of abandoned well
   C. Permit No. (required only in a Ground Water Control Area)

Type of well to be registered: (Check One)
- [ ] IRRIGATION
- [X] MUNICIPAL
- [ ] INDUSTRIAL
- [ ] Other

2. Name & address of well owner:
   Village of Eustis,
   P.O. Box 249
   Eustis, NE 69028
   Zip Code 69028 Phone (308) 486-3661 (08530)

3. Name & address of well driller:
   Layne-Western Co., Inc.
   4430 Commercial Avenue
   Omaha, Nebraska
   Zip Code 68110 Phone: (402) 451-2388

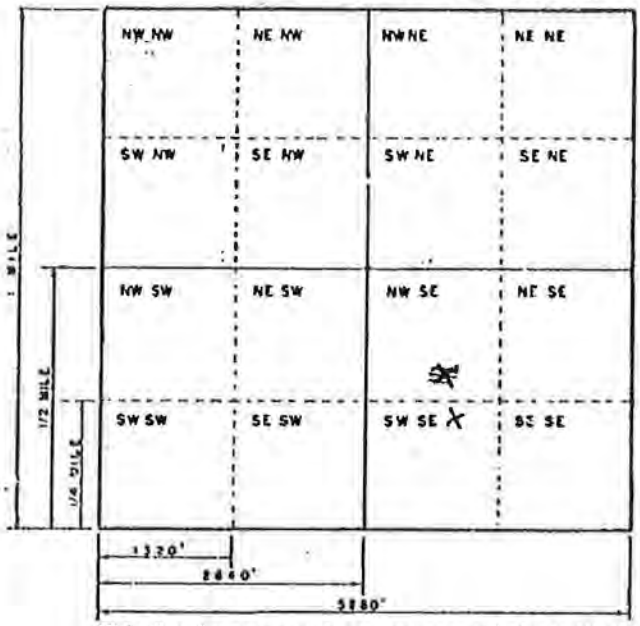
4. Location & purpose of the well:
   A. 22 Middle Republican Natural Resources District (Identify)
   B. SW ¼ of the SE ¼ of Section 15, Township 8N, Range 24 [ ] E [X] W, (check one)
      Frontier County.
   C. The well is 200 feet from the nearest municipal, irrigation, or industrial well. The nearest well is owned by [X] you [ ] someone other than you. (check one)
   D. The well is intended to irrigate ——— acres of land, and it is intended to irrigate all or parts of the following land:
      OR
   E. The well shall be used for purposes of: Potable Water Supply

5. Well and pump specifications:
   A. Pumping rate under normal conditions: 600 gallons per minute.
   B. Total well depth: 305 feet.
   C. Inside diameter of the casing: 15.25 inches.
   D. Static (non-pumping) water level in the well: 112 feet below ground surface.
   E. Depth of water under normal pumping conditions: 142 feet below ground surface.
   F. Pump column: Diameter 8 inches. Length 210 feet.
   G. The well was completed on or about June 25, 1970.

MORE ON BACK

MORE ON BACK

(With an "X" mark the location of the well)



This drawing represents one square mile (a section). Each small subdivision is a 40-acre tract.

I certify that I am familiar with the information contained on this registration, and that to the best of my knowledge and belief such information is true, concise and accurate.

Village of Eustis 8/9/84
Well Owner's Signature Date
David McClatchy

Both a Well Registration and Driller's Certificate must be completed in triplicate and in full. An incomplete or defective form will be returned. A non-refundable $7.50 fee (payable to the Director of Water Resources) must accompany your submittal. No fee is required to register: (1) a permitted well within a Ground Water Control Area; (2) a well constructed to replace a previously registered well; or (3) a well connected in a series with another well previously registered. Forward to:

State of Nebraska
Department of Water Resources
301 Centennial Mall-South
P.O. Box 94676
Lincoln, Nebraska 68509

Revised April, 1978

1

Registration No. (MUNICIPAL) G-28712C County Frontier Date Filed 8/23/84

STATE OF NEBRASKA
CERTIFICATE OF WELL DRILLER

Permit No. ..... (required only in a control area)

Name & Address of well driller:

Well Location:

22 Middle Republican ..... Natural Resources District

....SW.. Quarter of the.....SE.....Quarter of Section.....15....., Township.....8N....., Range ..24W.....,

.....Frontier..... County, and owned by ..Village..of..Eustis,..Nebraska.....

Drilling & construction specifications:

1. Date construction was begun: .....June..17....., 19 70..
2. Date construction was completed: .....June .25....., 19 70..
3. Diameter of the drilled hole: ....36..... inches.
4. Was the hole electronically logged? ☐ Yes ☒ No.
5. How is drilled hole sealed (not sealed)? .....With..10'..of..concrete..grout.....

.....

6. Well casing & screen: .....Total..of..36'..of..16"..x..1/4..Armco..Iron..Screen..placed..from..281'...to..305'...
(Give type of casing, lengths and vertical position of plain and slotted segments, slot or perforation size.)
and 195' to 207' and 271' of 16" x 1/4 steel casing to 2' above ground level
7. Is the well artifically gravel stabilized? ☐ Yes ☐ No

Pumping test information:

1. Pumping rate: ....754.... gallons per minute.
2. Depth to water before pumping: .....112.... feet.
3. Depth to water.....142.... feet after pumping ...1440.... minutes.

DRILLING LOG ON BACK

DRILLING LOG ON BACK

DRILLING LOG

DEPTH IN FEET FROM	TO	MATERIAL DRILLED
0	164'	Brown Clay
164'	193'	Sandrock and clay streaks
193'	207'	Coarse sand and gravel
207'	279'	Sandrock
279'	299'	Medium and coarse sand
299'	305'	Gravel

Richard S. Hunter
Well Driller's Signature

8/6/84
Date

Richard S. Hunter

August 3, 1984

STATE OF NEBRASKA
DEPARTMENT OF NATURAL RESOURCES
WATER WELL REGISTRATION

Fee Paid	$70.00	DNR Cash Fund	$18.50
HHSS Fee	$30.00	HHSS-DNR Cash Fun	$0.00
Get Billing	22546		

FOR DEPARTMENT USE ONLY

NOL ID	122366590927817	NOL Status	Accepted	Well Status	I	Registration Code	G-150792
Owner ID	92804	NOL Date	10/11/2008	Call Up Code		Registration Date	10/14/2008
Seq Num	194760			Call Up Date			

Add

10142008 - 194760 -WWRF

1a Owner's Name: Jeff Bromander
b Company Name:
c Correspondent Name: Attention Name:
Address: 74682 E. Canyon Rd.
City: Eustis State: NE Zip Code: 69028 - Phone: 308 - 486-5372

2a HHSS Contractor Lic ID: 297652 Contractor's Name: Jeffrey B. Remmenga
Contractor's License No: 39384 Contractor's Email Address: remmengadrilling@yahoo.com
b Drilling Firm Name: Remmenga Drilling Company
Address: 501 Ripley
City: Elwood State: NE Zip Code: 68937 Phone: 308 - 785-2290
Drilling Firms Email Address:

3a Well Location: SWSE of Section: 14 Township: 8 North, Range: 24 W (E/W), Frontier County
b Natural Resource District: Central Platte
c The well is feet from the (N/S) section line and feet from the (E/W) section line
GPS: or Latitude: 40 39' 22.70" Longitude: -100 00' 33.20"
d Street address or block, lot and subdivision, if applicable: Block No Lot
e Location of water use, if applicable (give legal descriptions): Same
f If for irrigation, the land to be irrigated is Acres
g Well Reference letter(s), if applicable:

4 Permits	Permits Number	Date	Permits	Permits Number	Date
Management Area Permit			Transfer Out-Of-State		
Surface Water			Well Spacing		
Geothermal			Conduct Water		
Industrial			Municipal		
Industrial Transfer Notice			Other		

5 Purpose of Well: Livestock Other:
Notes:

6 Wells in a Series
a Is this well a part of a series? ☐
b If one or more of the wells in the series is currently registered, give the well registration number
c How many wells in the series are you registering at this time?

7 Replacement and abandoned well information Replacement Number
a Is this well a replacement well? ☐
b Registration number of original well
e Original well pump column size: inches.

10142008 - 194760 -WWRF

If not registered, date original well was constructed

c Original well last operated

d Replacement well is feet from original well.

e Location of water use of original well

Please Select One:

f.

Use:

If nonconsumptive, State use:

8 Pump Information

a Is pump installed at this time?

Is pump installed by well owner in section 1?

Is pump installed by contractor in section 2?

Else installed by pump installer.

b HHSS Installer's License ID.

Pump Installer's License No. Pump Installer's Name

Pump Installer's Email Address

Pump Installer's Firm Name

Pump Installer's Firm Address

City: State Zip Code -0000 Phone -

Pump Installer's Firm Email Address

c Pumping Rate gallons per minute measured or estimated

d Drop pipe diameter inches e Length of drop pipe feet.

f Pumping equipment installed / / g Pump Brand

h This well will be used to pump less than 50 gpm ☑

9 Well Construction Information

a Total well depth 205 feet. b Static Water Level 90 feet.

c Pumping Water Level 96 feet. d Well construction began: 09 / 26 / 2008

e Well construction completed: 09 / 26 / 2008 f Bore hole diameter in inches. Top 9 Bottom 9

g Casing and Screen Joints Glued Other

10 Well Construction (Casing and Screen)

Fr Depth	To Depth	Case Scrn	In Diam	Out Diam	Thickness	Scrn Slot Size	Material	Trade name	NOLID
0	195	casing	4.072	4.500	.214		PVC	PW Eagle	122366590927
195	205	screen	4.072	4.500	.214	.010	PVC	PW Eagle	122366590927

11 Well Construction (Grout and Gravel)

NOL ID	From Depth	To Depth	GroutGravel	Material
122366590927817	0	18	grout	Bentonite
122366590927817	18	72	gravel	AX
122366590927817	72	76	grout	Bentonite
122366590927817	76	205	gravel	AX

10142008 - 194760 -WWRF

12 Geolog Material Logged

NOL ID	From Depth	To Depth	Description
122366590927817	0	83	Topsoil & Clay
122366590927817	83	135	Sandy Clay Sandstone tr. of Lime
122366590927817	135	150	Fine Sand w/ tr. of Clay
122366590927817	150	195	Sandstone Clay & Lime
122366590927817	195	205	Good Sand Small to Med. Gravel tr. of Clay

STATE OF NEBRASKA
DEPARTMENT OF NATURAL RESOURCES
WATER WELL REGISTRATION

Fee Paid	$70.00	DNR Cash Fund	$18.50
HHSS Fee	$30.00	HHSS-DNR Cash Fun	$0.00
Get Billing	26631		

FOR DEPARTMENT USE ONLY

NOL ID	127350613224102	NOL Status	Accepted	Well Status	I	Registration Code	G-155760
Owner ID	97895	NOL Date	05/11/2010	Call Up Code		Registration Date	05/11/2010
Seq Num	204738			Call Up Date			

Add

05112010 - 204738 -WWRF

1a Owner's Name: Marcella F. Koch
b Company Name:
c Correspondent Name: Attention Name: Jeff Koch
Address: 74660 Rd. 419
City: Eustis State: NE Zip Code: 69028 - Phone: 308 - 486-5674

2a HHSS Contractor Lic ID: 297652 Contractor's Name: Jeffrey B Remmenga
Contractor's License No: 39384 Contractor's Email Address: remmengadrilling@yahoo.com
b Drilling Firm Name: Remmenga Drilling Company
Address: 501 Ripley
City: Elwood State: NE Zip Code: 68937 Phone: 308 - 785-2290
Drilling Firms Email Address:

3a Well Location: NWNE of Section: 24 Township: 8 North, Range: 24 W (E/W), Frontier County
b Natural Resource District: Central Platte
c The well is feet from the (N/S) section line and feet from the (E/W) section line
GPS: or Latitude: 40 39' 21.10" Longitude: -099 59' 17.00"
d Street address or block, lot and subdivision, if applicable: Block No Lot
e Location of water use, if applicable (give legal descriptions): Same
f If for irrigation, the land to be irrigated is Acres
g Well Reference letter(s), if applicable

4 Permits	Permits Number	Date	Permits	Permits Number	Date
Management Area Permit			Transfer Out-Of-State		
Surface Water			Well Spacing		
Geothermal			Conduct Water		
Industrial			Municipal		
Industrial Transfer Notice			Other		

5 Purpose of Well: Livestock Other:
Notes:

6 Wells in a Series
a Is this well a part of a series?
b If one or more of the wells in the series is currently registered, give the well registration number
c How many wells in the series are you registering at this time?

7 Replacement and abandoned well information Replacement Number
a Is this well a replacement well?
b Registration number of original well
e Original well pump column size: inches.

05112010 - 204738 -WWRF

If not registered, date original well was constructed

c Original well last operated

d Replacement well is feet from original well.

e Location of water use of original well

Please Select One:

f.

Use:

if nonconsumptive, State use:

8 Pump Information

a Is pump installed at this time? ☐

Is pump installed by well owner in section 1? ☐ Is pump installed by contractor in section 2? ☐

Else installed by pump installer.

b HHSS Installer's License ID.

Pump Installer's License No. Pump Installer's Name

Pump Installer's Email Address

Pump Installer's Firm Name

Pump Installer's Firm Address

City: State Zip Code -0000 Phone -

Pump Installer's Firm Email Address

c Pumping Rate gallons per minute measured or estimated

d Drop pipe diameter inches e Length of drop pipe feet.

f Pumping equipment installed / / g Pump Brand

h This well will be used to pump less than 50 gpm ☑

9 Well Construction Information

a Total well depth 218 feet. b Static Water Level 112 feet.

c Pumping Water Level 119 feet. d Well construction began: 05 / 06 / 2010

e Well construction completed: 05 / 06 / 2010 f Bore hole diameter in inches. Top 9 Bottom 9

g Casing and Screen Joints Glued Other

10 Well Construction (Casing and Screen)

Fr Depth	To Depth	Case Scrn	In Diam	Out Diam	Thickness	Scrn Slot Size	Material	Trade name	NOLID
0	208	casing	4.072	4.500	.214		PVC	PW Eagle	127350613224
208	218	screen	4.072	4.500	.214	.010	PVC	Jet Stream	127350613224

11 Well Construction (Grout and Gravel)

NOL ID	From Depth	To Depth	Grout Gravel	Material
127350613224102	0	12	grout	Bentonite
127350613224102	12	105	gravel	AX
127350613224102	105	112	grout	Bentonite
127350613224102	112	218	gravel	AX

05112010 - 204738 -WWRF

12 Geolog Material Logged

NOL ID	From Depth	To Depth	Description
127350613224102	0	95	Topsoil & Clay
127350613224102	95	115	Sandy Clay
127350613224102	115	154	Fine Sand & Sandy Clay
127350613224102	154	210	Clay Lime & Sandstone
127350613224102	210	216	Good Sand Small to Med. Gravel
127350613224102	216	240	Fine Sand Sandstone Clay w/ tr. of Lime

Test Hole 54-A-48 Lithology (Nebraska Statewide Test-Hole Database)
Source of data: http://snr.unl.edu/data/geologysoils/NebraskaTestHole/NebraskaTestHoleIntro.asp)

TestHole	Lith_Unit	Description	DepthFr	DepthTo	Note
54-A-48	Road fill	silt, dark brownish gray	0	0.6	None
54-A-48	Soil	silt, light brownish gray	0.6	2	None
54-A-48	Silt	medium brownish gray grading to medium buff gray, contains limy rootlets and nodules from 5 to 10 ft, limonitic nodules and a few gastropod shells from 10 to 25 ft	2	50	None
54-A-48	Silt	medium buff gray, fine texture	50	55	None
54-A-48	Silt	very slightly clayey, mottled medium gray and reddish brown	55	58	None
54-A-48	Silt	very slightly clayey, mottled medium gray and reddish brown	58	60	None
54-A-48	Silt	very slightly clayey, medium reddish buff, less reddish from 75 to 80 ft, more clayey from 80 to 90 ft, non clayey from 90 to 100 ft	60	100	None
54-A-48	Silt	sandy, medium reddish buff, contains very fine sand, less sandy and less red from 115 to 120 ft	100	120	None
54-A-48	Silt	medium buff gray with very slight reddish tint, coarse texture, finer texture from 135 to 140 ft	120	140	None
54-A-48	Silt	very slightly sandy, medium buff gray with slight red tint, slightly finer texture from 155 to 160 ft	140	160	None
54-A-48	Silt	medium brownish gray	160	190	None
54-A-48	Silt	sandy, contains pebbly zone from 194 to 195 ft	190	198.5	None
54-A-48	Silt	moderately calcareous, light gray tan, granular, contains calcareous nodules	198.5	206	None
54-A-48	Silt	light brownish gray	206	210	None
54-A-48	Sand and gravel	light brownish gray, texture grades from fine sand to fine gravel, some medium gravel from 215 to 220 ft	210	220	None
54-A-48	Sand	light brownish gray, texture grades from fine to very coarse sand	220	225	None
54-A-48	Sand and gravel	tan gray, texture grades from fine sand to fine gravel	225	229	None
54-A-48	Sand	silty, light brownish gray with slight red tint, texture grades from fine to medium sand	229	230	None
54-A-48	Silt	sandy, very calcareous, light whitish gray, contains fine to coarse sand	230	234	None
54-A-48	Sandstone and silt	sand, interbedded, very calcareous, light reddish brown to light gray, texture grades from fine to very coarse sand with some gravel	234	247	None
54-A-48	Sand and gravel	light gray to yellowish and reddish brown, texture grades from medium sand to medium gravel	247	250	None

TestHole	Lith_Unit	Description	DepthFr	DepthTo	Note
54-A-48	Sandstone and sand	silt, interbedded, sandstone, medium brown, texture grades from fine to coarse sand, sandy silty, calcareous, light gray	250	260	None
54-A-48	Siltstone and sandy silt	interbedded, siltstone, dark brown, sandy silt, very calcareous, light gray, contains fine to coarse sand	260	262	None
54-A-48	Sand and gravel	very calcareous, light reddish brown to medium gray, texture grades from fine sand to medium gravel, contains hard calcareous layer from 278 to 278.5 ft	262	283	None
54-A-48	Silt	sandy, moderately calcareous, light gray, contains fine to medium sand	283	286	None
54-A-48	Sandstone	medium brown, texture grades from fine to medium sand	286	296	None
54-A-48	Silt	sandy, very calcareous, light gray, contains fine to coarse sand, light brownish tint and calcareous nodules from 300 to 304 ft, no sand and whitish gray color at 304 ft	296	305	None
54-A-48	Sand and gravel	texture grades from coarse sand to medium gravel	305	312	None
54-A-48	Sand	silty, light yellowish gray, texture grades from fine to medium sand	312	314	None
54-A-48	Silt	clayey to sandy, medium brown, contains fine sand	314	316	None
54-A-48	Sand	silty, light gray, contains hard calcareous zone at 319 ft	316	320	None
54-A-48	Silt	medium reddish brown, contains intermittent hard calcareous layers	320	325	None
54-A-48	Sandstone	light gray, texture grades from fine to medium sand, contains intermittent silt layers, very calcareous and no silt layers from 335 to 342 ft	325	342	None
54-A-48	Silt	sandy, moderately calcareous, light grayish white, contains fine to medium sand, hard calcareous layers from 350 to 355 ft	342	355	None
54-A-48	Sand	silty, to silt, sandy, medium brown, contains fine sand, contains very calcareous layers	355	362.5	None
54-A-48	Sand	slightly silty, light brownish gray, texture grades from fine to coarse sand, yellowish gray from 390 to 395 ft, coarser texture from 395 to 400 ft	362.5	400	None
54-A-48	Sand	silty, light gray, texture grades from fine to medium sand	400	410	None
54-A-48	Sand	slightly silty, texture grades from fine to coarse sand, contains hard calcareous zones	410	420	None
54-A-48	Sand	light tan gray, texture grades from fine to medium sand	420	440	None
54-A-48	Sand	light tan gray, texture grades from fine to very coarse sand with trace of gravel	440	460	None

TestHole	Lith_Unit	Description	DepthFr	DepthTo	Note
54-A-48	Sand	slightly silty, medium brownish gray, texture grades from fine to medium sand	460	470	None
54-A-48	Sand	light brownish gray, texture grades from fine to coarse sand with some fine gravel	470	484.5	None
54-A-48	Limestone	light grayish white	484.5	485.7	None

Logs Used for Section B-B'

Mail to:
PO Box 94676
Lincoln, NE 68509-4676

Phone: (402)471-2363

STATE OF NEBRASKA
DEPARTMENT OF NATURAL RESOURCES
WATER WELL REGISTRATION

FOR DEPARTMENT USE ONLY

Registration Date 7-25-2001 Sequence No. 133132 Registration No G-111296
Owner Code No. 58383 Receipt No. R7587 Middle Republican NRD

1. Well Owner Keith & Kathleen Schmeeckle Telephone Number (308) 486-5680
Address P.O. Box 33
City Eustis State NE Zip Code 68028 + 0033

2. Drilling Firm Remnenga Drilling Co. Telephone Number (308) 785-2290
Address 501 Ripley Contractor's License No 39384
City Elwood State Ne. Zip Code 68937 + ~~0000~~

3. Permit Number(s) /

4. Purpose of well (indicate one): ___ Dewatering (over 90 days) + Domestic ___ Ground Heat Exchanger
___ Ground Water Source Heat Pump ___ Industrial ___ Injection ___ Irrigation (important, see 6D and 6E)
___ Livestock ___ Monitoring ___ Observation ___ Public Water Supply (non-community)
___ Public Water Supply (community) ___ Recovery ___ Aquaculture ___ Other ___

5. Replacement and abandoned well information.
A. Is this well a replacement well? ___ Yes ___ No
B. Registration number of abandoned well: ___
If not registered, date well construction completion (m) ___ /(d) ___ /(y) ___
C. Replacement well is ___ feet from abandoned well.
D. Abandoned well last operated (m) ___ /(d) ___ /(y) ___
E. Original well pump column size: ___ inches.
F. Completion of original well abandonment on (m) ___ /(d) ___ /(y) ___
G. Location of water use of abandoned well: ___

6. A. Well location: NW ¼ of the ___ ¼ of Section 15 Township 8 North, Range 24 East (West) Frontier County
NW ¼ N. of Hiway Tract No. 3 15-8-24 4.78 Fairview Precinct
B. The well is 127 feet from the (North) or South) section line and 155 feet from the (East (West) section line
(circle one) (circle one)
C. Street address or block, lot and subdivisions, if applicable: —
D. Location of water use, if applicable (give legal descriptions): —
E. If for irrigation, the land to be irrigated is ___ acres.
F. Well reference letter(s), if applicable: —

7. Pump Information.
Is pump installed at this time: X Yes ___ No
If yes, complete items A through F.
If no, complete items A and D with estimated information for those wells in which pump will be installed.
A. Actual pumping rate, if applicable: 30 gallons per minute. Measured ☐ or Estimated ☒
B. Drop pipe diameter: 2 inches. C. Length of drop pipe: 210 feet
D. Pumping equipment installed: (month) 9 /(day) 18 /(year) 85 E. Brand/Type: Gay Inc.
F. Company Name K.E. Well Pump Installer Name GARY DAVIS
Address H.C. 70 Box 57 Telephone Number (308) 569-2358
City Farnam State Ne Zip Code 69029 + Contractor's License No. 2924

G-111296

Well Construction Information.

A Total well depth: 300 feet. B. Static water level: 150 feet.

C Pumping water level: 190 feet ☒ Estimated or ☐ Measured (at what gallons per minute rate 50

D Well Construction began: (month) 8 (day) 13 (year) 85 E. Well Construction completed (month) 8 (day) 13 (year) 85

F Bore hole diameter: 10 inches.

G. Plain Casing: Diameter 6.065 ID 6.625 OD inches. Type of material: PVC

Wall thickness: .280 inch(es). Joints—Welded/Glued/Threaded/Other: _____

Placement depth(s) from 0 ft. to 280 ft. from _____ ft. to _____ ft.

H Screen: 6.065 ID 6.625 OD in.; Type of material PVC

Screen openings (slot size): 0.010 Trade name: TITAN

Placement depth(s) from 280 ft. to 300 ft. from _____ ft. to _____ ft. Guides at 300 ft

Gravel pack interval(s) from 10 ft. to 300 ft. from _____ ft. to _____ ft Grade size CONCRETE

Grouted/Sealed from 0 ft. to 10 ft., with CLAY (type)

from _____ ft. to _____ ft., with _____ (type)

K. Drilling method: ROTARY L. Drilling fluid: WATER

Well development technique (total time and method): PUMPED WITH SUB PUMP

Will chemicals, fertilizer or antifreeze be injected or utilized in the system? ___ Yes X No

If yes, what will be used: _____

Geologic Materials Logged

DEPTH IN FEET FROM	TO	DESCRIPTION	DEPTH IN FEET FROM	TO	DESCRIPTION
0	90	TOP SOIL & CLAY			
90	155	CLAY, SILTY CLAY, LIME STRK'S			
155	201	FINE SAND, SANDSTONE, CLAY			
201	215	" " LIME			
215	230	SANDSTONE, CLAY, TR. GRAVEL			
230	240	" , LIME, SOME CLAY			
240	249	SAND, GRAVEL			
249	271	SANDSTONE, CLAY, LIME STRK'S			
271	279	SAND, GRAVEL			
279	288	SANDSTONE, CLAY, SOME GRAVEL			
288	300	SAND, GRAVEL			

(Additional sheets may be submitted)

I am familiar with the information submitted on this registration, and to the best of my knowledge it is true

Jeffrey R. Remmenga — Water Well Contractor's Signature

Date

Kirk Schmeckle — Water Well Owner's Signature

6/27/01

Revised November 1987
DWR Form 602

STATE OF NEBRASKA
DEPARTMENT OF WATER RESOURCES
WELL REGISTRATION

A ground water well will be registered when the following are completed and received together by the Department:
1. Well Registration Form (DWR Form 602) ✓
2. Certificate of Well Driller (DWR Form 603) ✓
3. A $20.00 fee (payable to the Director of Water Resources) except when registering:
   a) a replacement well. A replacement well shall mean a well which replaces a registered abandoned well that was last operated in the past five years and is within six hundred feet of said abandoned well; or,
   b) well(s) permitted under the Municipal and Rural Domestic Transfers Permit Act.
4. The most recent United States Department of Agriculture aerial photograph(s), available at the county Agricultural Stabilization and Conservation Service, marked to show the following:
   a) The location of the well to be registered.
   b) The location of wells owned by you in the same section. Each well should be labeled to show the use of water and the registration number. Abandoned wells should be shown also.
   c) If the well is for irrigation, the land to be irrigated should be shown by a crosshatch pattern and the number of acres irrigated from the well should be indicated.

For Department Use Only

Registration Number: G-73769
Registration Date: 6/17/91
Receipt Number: 72441
NRD: 22 - Middle Republican

1. Name of well owner Village of Eustis Telephone Number (308) 486 3661
   Address Box 249
   City Eustis State NE Zip Code 69028 (08530)
2. Name of well driller Remmenga Drilling Telephone Number (308) 785-2290
   Address Contractor's License Number 39179
   City Elwood, NE State Zip Code 68937
3. Ground Water Control or Management Area Permit Number Middle Republican - Not Controlled.
4. Ground water withdrawn from this well will be for (Indicate one)
   ___ Irrigation X Municipal use ___ Industrial use ___ Other ___ (Indicate use)
5. Replacement and abandoned well information:
   A. Is this well a replacement well? ___ Yes X No
   B. Give the registration number of the abandoned well: ___
   C. The replacement well is ___ feet from the abandoned well.
   D. The abandoned well was last operated ___, 19___.
6. Well and pump information:
   A. Pumping rate under normal conditions: 700 gallons a minute.
   B. Total well depth: 383 feet.
   C. Pump column: Diameter: 8 inches. Length: 240 feet.
   D. Will chemicals or fertilizer be injected into the distribution system? ___ Yes X No
   E. The well was completed: 4-25, 19 91.
7. A. Well location: SW ¼ of the NW ¼ of Section 15, Township 8 North, Range 24 ~~East~~/West, Frontier County. 1970S 1300E
   B. The well is 1970 feet from the North/~~South~~ section line and 1300 feet from the ~~East~~/West section line.
   C. If for irrigation, the land to be irrigated is NA acres in the following legal description: ___

I am familiar with the information submitted on this registration, and to the best of my knowledge it is true.

X 6-13-91
Date

X Vern D Wolf Chairman Village Board
Well Owner's Signature

Forward to:

State of Nebraska
Department of Water Resources
301 Centennial Mall South
P.O. Box 94676
Lincoln, Nebraska 68509-4676
(402) 471-2363

STATE OF NEBRASKA
DEPARTMENT OF WATER RESOURCES

Revised 1985
DWR Form 603

CERTIFICATE OF WELL DRILLER

1. Name and address of well driller: Remmenga Drilling Co.
R.R.1 Box 2
Elwood, Ne. 68937

Zip Code _____ Telephone (___) _____

2. Name and address of well owner:
Village of Eustis
Eustis, Nebr.

Zip Code 69028 Telephone (402) 486-3661

3. Permit Number: NA
(If applicable)

For Department Use Only

Registration Number: G-73769

Registration Date: 6/17/91

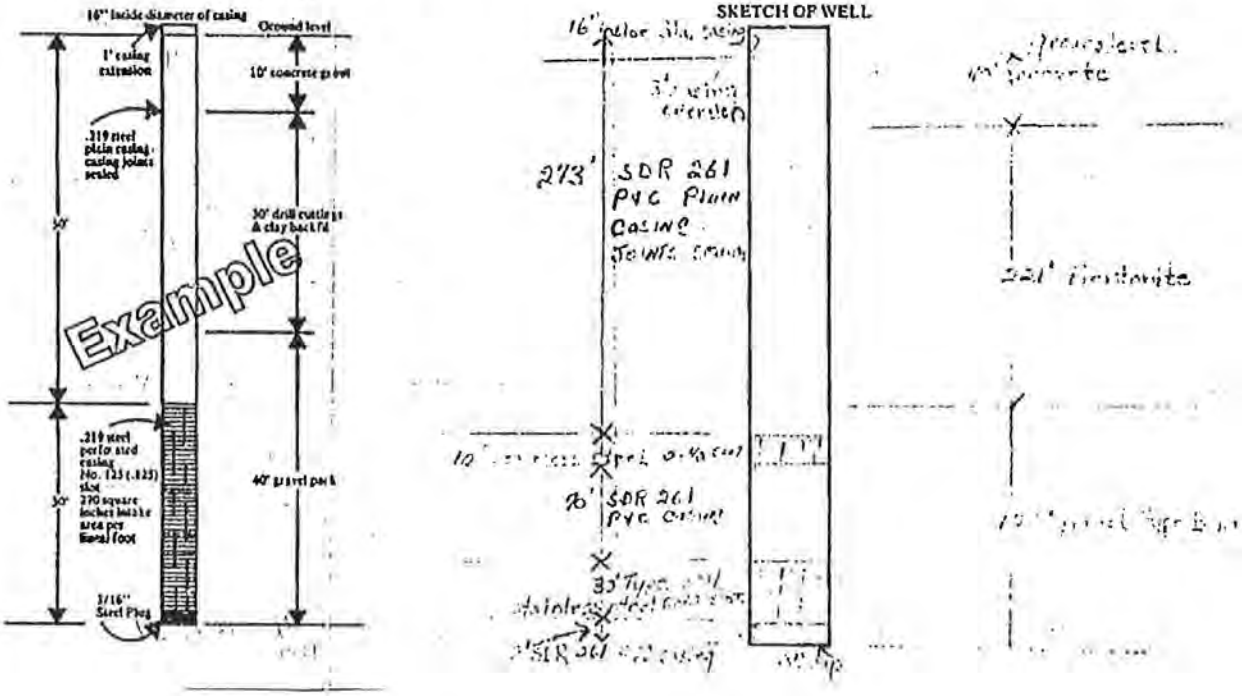
Receipt Number: 72441

NRD: 22 - Middle Republican

4. Well location: SW 1/4 of the NW 1/4 of Section 13, Township 8 North, Range 24 ~~East~~/West, Frontier County.
The well is 1920 feet from the north (North/South) section line and 1300 feet from the west (East/West) section line.

5. Well and pumping information: (If a timed pump test was conducted, submit complete pumping and drawdown data on separate sheet of paper.)
   A. Construction began: 4-24, 1991.
   B. Construction completed: 4-25, 1991.
   C. Drilled hole diameter: 30 inches.
   D. Static water level: 147 feet.
   E. Pumping level expected under normal operating conditions: 214 feet.

6. Indicate on the SKETCH OF WELL the location of the plain casing and screen segments. Give the lengths of the segments in feet. Also, identify the size, weight, type and inside diameter of segments; where the hole is sealed and backfilled and the type of seal(s) and backfill used.



DRILLING LOG

DEPTH IN FEET FROM	TO	MATERIAL DRILLED	DEPTH IN FEET FROM	TO	MATERIAL DRILLED
0	20	topsoil & clay			
20	102	clay			
102	130	fine sand, layers & clay			
130	170	sandy clay w/lime strks			
170	208	sandy clay w/lime layers			
208	215	clay, lime strks, some sand & gravel			
215	220	some sand, gravel, sandstone & clay			
220	224	good sandstone, tr of gr, some clay			
224	236	sandstone, clay & lime			
236	240	fine to med sand & clay			
240	245	good sand, sm to med gr., s/clay layers			
245	255	clay, lime tr of gravel			
255	262	good sand to sm gr. s/clay, lime strks.			
262	265	clay, lime, sandstone			
265	279	good sand, med gravel			
279	281	clay, lime & gravel			
281	284	good sand, sm to med gravel s/clay			
284	304	sandstone, clay & lime			
304	315	sandstone, clay, lime s/good sand			
315	334	fine sand, sandstone, some clay & lime			
334	336	lime, not to hard			
336	340	good sandstone, clay layers, lime strks.			
340	345	good sandstone, med sand tr of clay			
345	350	med to good sand			
350	358	good sand sm gravel			
358	366	clay, lime and sandstone			
366	370	clay & mostly lime			
370	380	good sandstone, lime layers tr of gravel			
380	383	fine sand & sandstone			

Remmenga Drilling Co.

Robert B. Remmenga
Well Driller's Signature

4-29-91
Date

Revised November 1987
DWR Form 602

STATE OF NEBRASKA
DEPARTMENT OF WATER RESOURCES
WELL REGISTRATION

A ground water well will be registered when the following are completed and received together by the Department:

1. Well Registration Form (DWR Form 602)
2. Certificate of Well Driller (DWR Form 603)
3. A $20.00 fee (payable to the Director of Water Resources) except when registering:
   a) a replacement well. A replacement well shall mean a well which replaces a registered abandoned well that was last operated in the past five years and is within six hundred feet of said abandoned well; or,
   b) well(s) permitted under the Municipal and Rural Domestic Transfers Permit Act.
4. The most recent United States Department of Agriculture aerial photograph(s), available at the county Agricultural Stabilization and Conservation Service, marked to show the following:
   a) The location of the well to be registered.
   b) The location of wells owned by you in the same section. Each well should be labeled to show the use of water and the registration number. Abandoned wells should be shown also.
   c) If the well is for irrigation, the land to be irrigated should be shown by a crosshatch pattern and the number of acres irrigated from the well should be indicated.

For Department Use Only

Registration Number: G-76059
Registration Date: 11/30/92
Receipt Number: 74467
NRD: 22 - Middle Republican

1. Name of well owner FARMLAND SERVICE COOP, Inc. (Duane Sukrau) Telephone Number (308) 486 - 3551
   Address P.O. Box 67
   City Eustis State Ne Zip Code 69028

(02680)

2. Name of well driller Geotechnical Services Inc Telephone Number (308) 381 - 1987
   Address 3826 Arch Avenue Contractor's License Number #49008
   City Grand Island State Ne Zip Code 68803

3. Ground Water Control or Management Area Permit Number N/A

4. Ground water withdrawn from this well will be for (Indicate one)
   ___ Irrigation ___ Municipal use ___ Industrial use ✓ Other Monitoring Well (DH-5) (Indicate use)

5. Replacement and abandoned well information:
   A. Is this well a replacement well? ___ Yes ✓ No
   B. Give the registration number of the abandoned well: N/A
   C. The replacement well is N/A feet from the abandoned well.
   D. The abandoned well was last operated N/A, 19___.

6. Well and pump information:
   A. Pumping rate under normal conditions: N/A gallons a minute.
   B. Total well depth: 113.4 feet.
   C. Pump column: Diameter: N/A inches. Length: N/A feet.
   D. Will chemicals or fertilizer be injected into the distribution system? ___ Yes ✓ No
   E. The well was completed: 9-16, 19 91.

7. A. Well location: N/A 1/4 of the SE 1/4 of Section 15, Township 8 North, Range 24 East/West, Frontier County. 2217N 2623W
   B. The well is 2217 feet from the North/(South) section line and 2623 feet from the (East)/West section line.
   C. If for irrigation, the land to be irrigated is N/A acres in the following legal description: N/A

I am familiar with the information submitted on this registration, and to the best of my knowledge it is true.

11-24-92
Date

FARMLAND SERVICE COOP [signature]
Well Owner's Signature

Forward to:

State of Nebraska
Department of Water Resources
301 Centennial Mall South
P.O. Box 94676
Lincoln, Nebraska 68509-4676
(402) 471-2363

printed on recycled paper

Revised 1985
DWR Form (6)

STATE OF NEBRASKA
DEPARTMENT OF WATER RESOURCES
CERTIFICATE OF WELL DRILLER

1. Name and address of well driller: Geotechnical Services Inc.
3826 Arch Avenue
Grand Island, Ne
Zip Code 68803 Telephone (308) 381-1987

2. Name and address of well owner: Duane Sukrow
Farmland Service Coop
P.O. Box 67
Eustis, Ne
Zip Code 69026 Telephone (308) 486-3551

3. Permit Number: N/A
(If applicable)

For Department Use Only

Registration Number: G-76059

Registration Date: 11/30/92

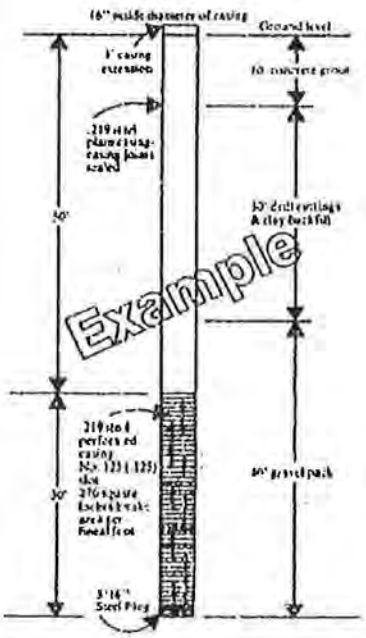
Receipt Number: 74467

NRD: 22 - Middle Republican

4. Well location: NW 1/4 of the SE 1/4 of Section 15, Township 8 North, Range 24 East (West)
Frontier County.
The well is 3717 feet from the South (North-South) section line and 2673 feet from the East (East-West) section line.

5. Well and pumping information: (If a timed pump test was conducted, submit complete pumping and drawdown data on separate sheet of paper.)
   A. Construction began: 9-16, 1991
   B. Construction completed: 9-16, 1991
   C. Drilled hole diameter: 6 inches.
   D. Static water level: 111.45 feet.
   E. Pumping level expected under normal operating conditions: N/A feet.

6. Indicate on the SKETCH OF WELL the location of the plain casing and screen segments. Give the lengths of the segments in feet. Also, identify the size, weight, type and inside diameter of segments; where the hole is sealed and backfilled and the type of seal(s) and backfill used.



SKETCH OF WELL

printed on recycled paper

DRILLING LOG

DEPTH IN FEET FROM	TO	MATERIAL DRILLED	DEPTH IN FEET FROM	TO	MATERIAL DRILLED

Well Driller's Signature

10-14-92
Date

G-76059

MONITOR WELL SCHEMATIC

WELL NO.	LOCATION OF WELL	ELEVATION	DATUM	DRILLER	LOGGER
DH-5	See Site Plan	PVC 105.3'	200.0	Rick Kuehn	Dave Cookston

WATER LEVEL OBSERVATIONS				TYPE OF SURFACE	DRILL RIG
WHILE DRILLING	END OF DRILLING	24 HOURS AFTER DRILLING	___ HOURS	Concrete	GEO-88
				DRILLING METHOD	TOTAL DEPTH
104.0'	111.45'	105.34'		6" Continuous Flight Auger	113.4'

PROTECTIVE COVER

Type: Flush Mount
Size: Reg.
Pad Size: _____

GROUT

BENTONITE
Amount: 200 (lbs.)
Water: 100 (gal.)

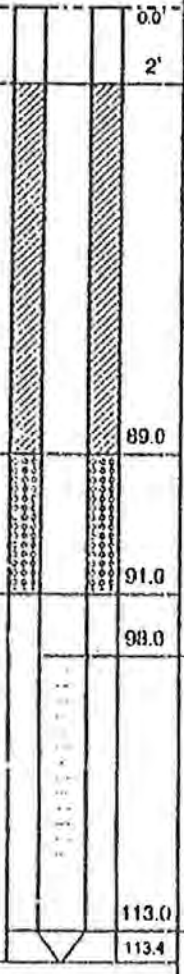
PORTLAND CEMENT
Type: _____
Amount: _____ (lbs.)
Bentonite: _____ (lbs.)
Water: _____ (gal.)

WELL SEAL

Type: Bentonite chips
Amount: 50 (lbs.)
Water: 5 (gal.)

WELL PACK

Type: 10-20 sieve
Amount: 300 (lbs.)



INITIAL PUMP DATA

Rate _____
Drawdown _____

	Time	Water Level
Start	_____	_____
Stop	_____	_____

RISER

Type: PVC
Schedule: 40
Inside Diameter: 2"
Length: 10'
#: 9
Length: 8.0'
#: 1

SCREEN

Type: PVC
Schedule: 40
Slot: 0.010
Inside Diameter: 2"
Length: 10'
#: 1
Length: 5'
#: 1

END CAP

Type: PVC
Length: 0.4

BRIEF GEOLOGIC DESCRIPTION

See Boring Log DH-5

NOTES:

Geotechnical Services Inc.

Project: FARMLAND SERVICE COOP
Location: EUSTIS, NEBRASKA
Job No. 1805910 Date 9/16/91

Form 308 7/93

BORING LOG

DRILL HOLE NO.	LOCATION OF DRILL HOLE	ELEVATION	DATUM	DRILLER	LOGGER
DH-5	See Site Plan	196.73	200.0	Rick Kuehn	Dave Cookston

WATER LEVEL OBSERVATIONS				TYPE OF SURFACE	DRILL RIG
WHILE DRILLING	END OF DRILLING	24 HOURS AFTER DRILLING	___ HOURS	Concrete	GEO-88
				DRILLING METHOD	TOTAL DEPTH
104.0'	111.45'	105.34		6" Continuous Flight Auger	113.0'

DEP. Ft.	SAMPLE NO. & TYPE	OVA READING	COLOR	MOIST	GROUP NAME	GEOLOGIC DESCRIPTION & OTHER REMARKS	DEP. FT.
						6" Concrete pavement	
5	A-1	0	Black	Slightly Moist	CL	LOESS Fine silty clay Lean clay	5
10	A-2	0	Brown Dark Brown				10
15	A-3	0.5	Light Brown		CL	PEORIAN LOESS Friable Lean clay Iron stains	15
20	A-4	1				Nodules of calcium carbonate	20
25	A-5	0					25
30	A-6	0	Grayish Brown	Moist			30
35	A-7	0				Very fine grain clayey silt at 33.0'	35

Geotechnical Services Inc.

Project	FARMLAND SERVICE COOP		
Location	EUSTIS, NEBRASKA		
Job No.	1805910	Date	9/16/91

Form 301 3/90

BORING LOG

DRILL HOLE NO.	LOCATION OF DRILL HOLE	ELEVATION	DATUM	DRILLER	LOGGER
DH-5	See Site Plan	196.73	200.0	Rick Kuehn	Dave Cookston

DEP. Ft.	SAMPLE NO.& TYPE	OVA READING	COLOR	MOIST	GROUP NAME	GEOLOGIC DESCRIPTION & OTHER REMARKS	DEP. FT.
	A-8	0	Light Brown	Moist	ML\CL	PEORIAN LOESS Clayey silt Iron staining throughout Silty clay at 38.0' Lean clay	40
40	A-9	0					45
45	A-10	0				Clayey silt at 46.5' Lean clay	50
50	A-11	1				Heavy iron staining at 53.0'	55
55	A-12	0.5				Calcium carbonate throughout (calcarious concretions)	60
60	A-13	0					65
65	A-14	0					70
70	A-15	0.5					75
75							

Geotechnical Services Inc.

Project	FARMLAND SERVICE COOP
Location	EUSTIS, NEBRASKA
Job No. 1805910	Date 9/16/91

Form 301-2 3/90

BORING LOG

DRILL HOLE NO.	LOCATION OF DRILL HOLE	ELEVATION	DATUM	DRILLER	LOGGER
DH-5	See Site Plan	196.73	200.0	Rick Kuehn	Dave Cookston

DEP. Ft.	SAMPLE NO.& TYPE	OVA READING	COLOR	MOIST	GROUP NAME	GEOLOGIC DESCRIPTION & OTHER REMARKS	DEP. FT.
	A-16	0	Light Brown	Moist		PEORIA LOESS Clayey silt, lean clay Iron stains, calcarious concretions	
80			Reddish Brown		ML\CL	LOVELAND LOESS Very fine silty clay Lean clay	80
	A-17	0				Large calcarious concretions at 82.0'	
85							85
	A-18	0				Iron stains throughout	
90							90
	A-19	0				Manganese nodules	
95							95
	A-20	0		Very Moist			
100							100
	A-21	1					
105				Wet			105
110							110
115						BOTTOM OF HOLE 113.0'	115

Geotechnical Services Inc.

Project	FARMLAND SERVICE COOP
Location	EUSTIS, NEBRASKA
Job No. 1805910	Date 9/16/91

Form 301-3 3/90

August 23, 1984

G-28712C
MUNICIPAL

Village of Eustis
P. O. Box 249
Eustis, Nebraska 69028

Dear Sirs:

Registration forms for a municipal well connected to previously registered wells were filed in this office on August 23, 1984. This new well is located in the SW¼SE¼ of Section 15, Township 8, Range 24 West, Frontier County and is identified as G-28712C (Municipal). The new well creates a series of three wells.

This letter is your official record of this registration.

Sincerely,

DEPARTMENT OF WATER RESOURCES

Susie Cotton
Staff Assistant
Ground Water Section

SC:jm

Revised December, 1978 DWR Form 602

DO NOT WRITE IN THIS SPACE

(MUNICIPAL) 1

Registration No. G-28712C County Frontier Date Filed 8/23/84

STATE OF NEBRASKA
DEPARTMENT OF WATER RESOURCES
WELL REGISTRATION

1. General information:
   A. Connected well
      Is this well connected to another well? [X] Yes [ ] No G28712A&B
      If yes, give registration number of previously registered well
      (If new installation consists of a series of wells with one outlet, complete registration forms and driller's certificates for each and submit $7.50)
   B. Replacement well
      Is this well to replace a permanently abandoned well? [ ] Yes [X] No
      If yes, give registration number of abandoned well
   C. Permit No. (required only in a Ground Water Control Area)

Type of well to be registered: (Check One)
- [ ] IRRIGATION
- [X] MUNICIPAL
- [ ] INDUSTRIAL
- [ ] Other

2. Name & address of well owner:
   Village of Eustis,
   P.O. Box 249
   Eustis, NE 69028

   Zip Code 69028 Phone (308) 486-3661 (08530)

3. Name & address of well driller:
   Layne-Western Co., Inc.
   4430 Commercial Avenue
   Omaha, Nebraska

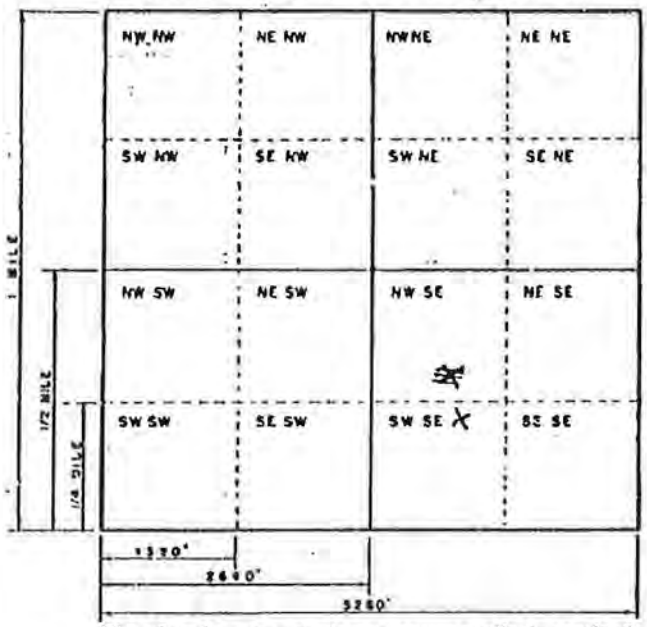
   Zip Code 68110 Phone: (402) 451-2388

4. Location & purpose of the well:
   A. 22 Middle Republican Natural Resources District (Identify)
   B. SW ¼ of the SE ¼ of Section 15, Township 8N, Range 24 [ ] E [X] W, (check one)
      Frontier County.
   C. The well is 200 feet from the nearest municipal, irrigation, or industrial well. The nearest well is owned by [X] you [ ] someone other than you. (check one)
   D. The well is intended to irrigate ——— acres of land, and it is intended to irrigate all or parts of the following land:
      OR
   E. The well shall be used for purposes of: Potable Water Supply.

5. Well and pump specifications:
   A. Pumping rate under normal conditions: 600 gallons per minute.
   B. Total well depth: 305 feet.
   C. Inside diameter of the casing: 15.25 inches.
   D. Static (non-pumping) water level in the well: 112 feet below ground surface.
   E. Depth of water under normal pumping conditions: 142 feet below ground surface.
   F. Pump column: Diameter 8 inches. Length 210 feet.
   G. The well was completed on or about June 25, 1970.

MORE ON BACK MORE ON BACK

(With an "X" mark the location of the well)



This drawing represents one square mile (a section). Each small subdivision is a 40-acre tract.

I certify that I am familiar with the information contained on this registration, and that to the best of my knowledge and belief such information is true, concise and accurate.

Village of Eustis 8/9/84
Well Owner's Signature Date
David McClatchy

Both a Well Registration and Driller's Certificate must be completed in triplicate and in full. An incomplete or defective form will be returned. A non-refundable $7.50 fee (payable to the Director of Water Resources) must accompany your submittal. No fee is required to register: (1) a permitted well within a Ground Water Control Area; (2) a well constructed to replace a previously registered well; or (3) a well connected in a series with another well previously registered. Forward to:

State of Nebraska
Department of Water Resources
301 Centennial Mall-South
P.O. Box 94676
Lincoln, Nebraska 68509

Revised April, 1970

1

Registration No. (MUNICIPAL) G-28712C County Frontier Date Filed 8/23/84

STATE OF NEBRASKA
CERTIFICATE OF WELL DRILLER

Permit No. ..... (required only in a control area)

Name & Address of well driller:

Well Location:

22 Middle Republican ..... Natural Resources District

....SW.. Quarter of the..... SE .....Quarter of Section.....15....., Township.....8N....., Range ..24W.....,

.....Frontier..... County, and owned by ..Village..of..Eustis,..Nebraska.....

Drilling & construction specifications:

1. Date construction was begun: .....June..12....., 19 70..
2. Date construction was completed: .....June .25....., 19 70..
3. Diameter of the drilled hole: ....36..... inches.
4. Was the hole electronically logged? ☐ Yes ☒ No.
5. How is drilled hole sealed (not sealed)? .....With..10'...of..concrete..grout.....

.....

6. Well casing & screen: .....Total..of..36'..of..16"..x..1/4..Armco..Iron..Screen..placed..from..281'...to..305'...
(Give type of casing, lengths and vertical position of plain and slotted segments, slot or perforation size.)
and 195' to 207' and 271' of 16" x 1/4 steel casing to 2' above ground level
.....
7. Is the well artifically gravel stabilized? ☐ Yes ☐ No

Pumping test information:

1. Pumping rate: ....754.... gallons per minute.
2. Depth to water before pumping: .....112.... feet.
3. Depth to water.....142..... feet after pumping ...1440.... minutes.

DRILLING LOG ON BACK

DRILLING LOG ON BACK

DRILLING LOG

DEPTH IN FEET FROM	TO	MATERIAL DRILLED
0	164'	Brown Clay
164'	193'	Sandrock and clay streaks
193'	207'	Coarse sand and gravel
207'	279'	Sandrock
279'	299'	Medium and coarse sand
299'	305'	Gravel

Richard S Hunter 8/6/84

Well Driller's Signature Date

Richard S. Hunter August 3, 1984

Licensed 1993
DWR Form 145

COPY

STATE OF NEBRASKA
DEPARTMENT OF WATER RESOURCES
WATER WELL REGISTRATION

FOR DEPARTMENT USE ONLY

Registration Date _____ Sequence No. 122931 Registration No. G-104890
Owner Code No. 55045 Receipt No. _____ Middle Republican NRD

1. Well Owner Kenneth W. Smith Telephone Number ( )
Address R.R. 1 Box 12C
City Eustis State NE Zip Code 69028

2. Drilling Firm Remmenga Drilling Co. Telephone Number (308) 785-2290
Address 501 Ripley Contractor's License No. 39179
City Elwood State NE Zip Code 68937

3. Permit Number(s) _____

4. Purpose of well (indicate one): ___Dewatering (over 90 days) X Domestic ___Geothermal ___Ground Heat Exchanger ___Ground Water Source Heat Pump ___Industrial ___Injection ___Irrigation ___Livestock ___Monitoring ___Observation ___Public Water Supply (with spacing (46-430)) ___Public Water Supply (without spacing) ___Recovery ___Aquaculture ___Other _____ (indicate use)

5. Replacement and abandoned well information.
A. Is this well a replacement well? ___Yes X No
B. Registration number of abandoned well: _____
C. Replacement well is _____ feet from abandoned well.
D. Abandoned well last operated _____, 19____
E. Original well pump column size: _____ inches.
F. Completion of original well abandonment on _____, 19____
G. Location of water use of abandoned well: _____

6. A. Well location: SW ¼ of the NE ¼ of Section 22, Township 8 North, Range 24 East (West), Frontier County.
X B. The well is 500 feet from the (North) or South) section line (Circle one) and 560 feet from the (East or (West) section line. (Circle one)
C. Street address or block, lot and subdivision, if applicable: _____
D. Location of water use, if applicable (give legal descriptions): _____
E. If for irrigation, the land to be irrigated is _____ acres.
F. Well reference letter(s), if applicable: _____

7. Pump Information.
Is pump installed at this time? X Yes ___No
If yes, complete items A through F.
If no, complete items A and D with estimated information for those wells in which pump will be installed.
A. Actual pumping rate, if applicable: 14 gallons per minute. Measured ☐ or Estimated ☒
B. Pump column diameter: 1¼ inches. C. Length of pump column: 210 feet
D. Pumping equipment installed: DEC 9, 1999. E. Brand/Type: GOULDS 5HB
F. Pump installed by: Contractor ☒ Owner ☐ Pump Installer ☐ License No. 29266

COPY

G-104890

8. Well Construction Information.

A. Total well depth: 302 feet. B. Static water level: 160 feet. C. Pumping water level: 170 feet.
☐ Estimated or ☐ Measured

D. Well Construction began: Nov 15 1999. E. Well Construction completed: Nov. 15 1999.

F. Bore hole diameter: 9 inch(es).

G. Plain Casing: Diameter 4.072 ID 4.500 OD inches. Type of material: PVC

Wall thickness: .214 inches. Joints–Welded/Glued/Threaded/Other: glued

Length(s) and placement(s) depth from 292 ft. to top ft. from ____ ft. to ____ ft.

H. Screen: 4.026 ID 4.500 OD in.; Type of material PVC

Screen openings (slot size): .010 Trade name: Crown-Line Guides at bottom ft.

Length(s) and placement(s) depth from 292 ft. to 302 ft. from ____ ft. to ____ ft.

I. Gravel pack interval(s) from 302 ft. to 167 ft. from 159 ft. to 13 ft. Grade size: concrete

J. Grouted/Sealed from 167 ft. to 159 ft., with bentonite (type)

from 13 ft. to top ft., with bentonite and clay (type)

K. Drilling method: mud rotary L. Drilling fluid: water

M. Well development technique (total time and method): test pumped sand pumed 2 hrs.

N. Will chemicals, fertilizer or antifreeze be injected or utilized in the system? ___ Yes X No
If yes, what will be used: ____

9. Geologic Materials Logged

DEPTH IN FEET FROM	TO	DESCRIPTION	DEPTH IN FEET FROM	TO	DESCRIPTION
0	80	topsoil & clay			
80	200	clay tr of lime			
200	260	clay lime sandstone			
260	268	good sand sm to med gravel			
268	277	sandy clay & lime strks			
277	290	clay lime & sandstone			
290	302	good sand sm to med gravel			
302	320	sandstone w/some clay & lime			

(Additional sheets may be submitted)

10. I am familiar with the information submitted on this registration, and to the best of my knowledge it is true.

Remmenga Drilling Co.

Robert R. Remmenga — Water Well Contractor's Signature — 11-18-99 Date

Kenneth A. Smith — Water Well Owner's Signature — 2-23-2000 Date

printed on recycled paper

Appendix C:

Historical Property Ownership Records for the Former CCC/USDA Facility

TABLE C.1 Summary of historical ownership records for the former CCC/USDA property.

	Property Transaction Record			
Date	Grantor (or Lessor)	Grantee (or Lessee)	Type	Document
Dec. 10, 1946	Samuels	Volkman	Warranty deed	Deeds Book 49 Pgae 674
Jun. 1, 1950	Volkman	CCC/USDA	Lease	Misc. Book 16 Page 387[a]
Sept. 15, 1954	Volkman	CCC/USDA	Lease extension	Misc. Book 18 Page 499[a]
Sept. 12, 1959	Volkman	CCC/USDA	Lease extension	Misc. Book 20 Page 788[a]
Mar. 25, 1964	Volkman	CCC/USDA	Lease extension	Misc. Book 27 Page 720[a]
Oct. 29, 1964	Volkman	CCC/USDA	Lease termination	Misc. Book 28 Page 161[a]
May 2, 1967	Volkman	Grabenstein	Warranty deed	Deeds Book 55 Pgae 154
Mar. 11, 1968	Grabenstein	Johnson	Warranty deed	Deeds Book 56 Pgae 182
Jan. 6, 1976	Johnson	Hi-Line Implement	Warranty deed	Deeds Book 57 Pgae 547
Feb. 10, 1983	Hi-Line Implement	Farmers State Bank	Warranty deed	Deeds Book 61 Pgae 293
May 4, 1988	Farmers State Bank	Schurr	Warranty deed	Deeds Book 62 Pgae 571
Jun. 23, 1993	Schurr	Eustis Ag & Auto, Inc.	Warranty deed	Deeds Book 64 Pgae 635
Nov. 16, 1998	Eustis Ag & Auto, Inc.	Smallfoot (Owner of Eustis Ag & Auto)	Warranty deed	Deeds Book 67 Pgae 185
Apr. 20, 2004	Farmers State Bank	Smallfoot (Owner of Eustis Ag & Auto)	Warranty deed	Deeds Book 69 Pgae 190
Mar. 22, 2006	Smallfoot (Owner of Eustis Ag & Auto)	A&T Repairs, Inc.	Warranty deed	Deeds Book 69 Pgae 721

[a] A copy of the documentation is in this appendix.

From Fred W. Volkman
To Commodity Credit Corporation
Filed June 1, 1950 at 9 o'clock A.M.
Recorded in Book 16 Page 387
Louis M. Hovey County Clerk

43.10

LEASE WITH OPTION TO PURCHASE

THIS LEASE, made and entered into this 1st day of May, 1950 by and between Fred W. Volkman of Eustis, Nebr., Lessor, and Commodity Credit Corporation Lessee.

WITNESSETH THAT:

1. The Lessor leases to the Lessee, and the Lessee hereby leases from the Lessor, upon the terms and conditions hereinafter stated, the following described real estate (hereinafter called "property") situated in the County of Frontier and State of Nebr., consisting of 6550 square feet of space in Block _____, Lot _____ Subdivision _____ Town or _____; or the Part of the N. E. ¼ N. W. ¼ of the S. E. of 1/4 of Section Township 8 Range 24, to permit the placing thereon of C.C.C. owned granaries and facilities. This space is located as indicated herein:

Begining at a point 600 feet east of the Northeast Corner of Block 15, original Town being the Northeast corner of Tract No. 15:
1--East 430 feet,
2--South 915.18 feet
3--North 52 degrees 2' West 213.73 feet along R. R. right of way
4--North 72 degrees 31' West 267.19 feet along right of way
5--North 712.45 feet to place of beginning.

2. The term of the lease shall be for a period of five years, commencing the 1st day of May, 1950, and ending the 1st. day of May, 1955, with the right of the Lessee to terminate said lease, and liability for any further rent, on the first day of any month of any year, by giving thirty days' previous notice in writing to the lessor.

3. As rent for said property, the Lessee shall pay the Lessor One hundred Dollars (100.00) per year, such rent to be payable October 1. of each year.

4. The Lessor warrants that he is the owner of the property, has the right to give the Lessee possession under this lease, and will, so long as this lease remains in effect, warrant and defend the Lessee's possession against any and all persons whomsoever.

5. The Lessee shall have the right to construct or erect storage structures or facilities on said property and, at the expiration of said lease or any renewal or extension thereof or at any time this lease is in effect, may remove said storage structures or facilities or any part thereof, whether or not such structures or facilities have become legally a fixture. It is, therefore, hereby agreed that the Lessee shall have the right of ingress and egress at any time to the space herein leased.

6. The Lessee shall not assign this lease nor sublet said property or any part thereof without the written consent of the Lessor.

7. The Lessor hereby reserves unto itself, and /or its lessees, the right to operate, maintain and renew such pipe lines, electric transmission lines telephone lines, telegraph lines, signal lines and other facilities of like character as may exist upon, under or over the leased premises as of the date of this lease, it being agreed that this lease is subject and subordinate to any and all rights granted by the Lessor for any such existing lines and facilities.

It is further agreed that upon the expiration of this lease, or in case the Lessee shall in any manner fail to comply with the terms and conditions hereof, the Lessee shall, forthwith, cease to use or remain upon said premises and shall remove all the improvements placed thereon by the Lessee and restore said premises to substantially their former State.

If the Lessee fails to surrender to the Lessor the leased premises, upon any termination or expiration of this lease, all the liabilities and obligations of the Lessee hereunder shall continue in effect until the leased premises are surrendered, and no termination or expiration hereof shall release the Lessee from any liability or obligation hereunder which theretofore or thereafter may accrue.

It is further agreed that this lease shall be binding upon the Lessee and assigns of the Lessee, and shall inure to the benefit of the Lessor, its successors and assigns.

No member of or Delegate to Congress or Resident Commissioner shall be admitted to any share or part of this agreement or to any benefit to arise therefrom. Nothing, however, herein contained shall be construed to extend to any incorporated company, if the agreement be for the general benefit of such corporation or company.

8. The Lessor grants and gives the Lessee the option, at any time while this lease is in effect, to purchase said Property from the Lessor, his heirs, executors, administrators, and assigns, for the sum of _____ Dollars ($_____). In the event the lessee shall exercise this option to purchase said property, the Lessor agrees to execute a good and sufficient warranty deed conveying fee simple title to said property free and clear of all taxes, liens, or encumbrances except for the following and no others: "or"

" A sum to be determined by appraisal by three disinterested persons, one of whom shall be named by the lessee, one by the lessor and the third to be selected by these two persons."

IN TESTIMONY WHEREOF, the parties have executed this instrument in duplicate this day and year first above written.

Harry T. Heater
Witness

F. W. Volkman Lessor
By _____

to
Commodity Credit Corporation.
Filed September 15,1954 at
11:30 A.M., and recorded in
Book 18 Misc. at Page 499.
Louis M. Hovey,
County Clerk.

CC Form-38
(4-2--54)

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURE STABILIZATION AND CONSERVATION
COMMODITY CREDIT CORPORATION
LEASE OF PROPERTY

THIS LEASE, made and entered into this 10 day of September, 1954, by and between Fred W. Volkman of Eustis,Nebraska, Lessor, and Commodity Credit Corporation, Lessee.

WITNESSETH THAT:

1. The Lessor leases to the Lessee, and the Lessee hereby leases from the lessor, upon the terms and conditions hereinafter stated, the following described real estate (hereinafter called "property") situated in the County of Frontier and State of Nebraska:

Part of the West ½ of the Sout east ¼ of Section xxxxx15-Township 8-Range 24 containing 2.0 acres xx more or less.

2. The term of the lease shall be for a period of five years, commencing the 1st day of October, 1954, and ending the 1st day of October, 1959. With the right of the Lessee, during such term or any extension thereof, to terminate said lease, and liability for any further rent, on the 1st day of October of any year, by giving 60 days' previous notice in writing to the Lessor.

3. As rent for said property, the Lessee shall pay the Lessor One Hundred Twenty Five Dollars ($125.00) per year, such rent to be payable in advance, but to be apportionable in the event the lease is terminated as provided in paragraph 2 hereof:

4. The Lessor warrants that he is the owner of the property, has the right to give the Lessee possession under this lease, and will, so long as this lease remains in effect, warrant and defend the Lessee's possession against any and all persons whomsoever.

5. The Lessee shall have the right, during this lease, to erect storage structures or facilities, make alterations, install scales, fences, or signs, in or upon the premises hereby leased and, at the expiration of said lease or any renewal or extension thereof or at any time this lease is in effect, may remove said storage structures, facilities, scales, fences or signs, or any part thereof, whether or not such structures, facilities, scales, fences, or signs have become legally a fixture.

6. The Lessee shall not assign this lease without the written consent of the Lessor. The Lessee, may, however,

~~688~~

LEAROWN LEDGER

sublet the structures on the premises leased hereunder, or any one or more of them for the term of the lease or any part thereof upon such terms and conditions as Lessee may wish to so sublet.

7. The Lessee, if required by the Lessor shall, upon the expiration of this lease, or renewal thereof, restore the premises to the same condition as that existing at the time of entering upon the same under this lease, reasonable and ordinary wear and tear and damages by the elements or by circumstances over which the Lessee has no control excepted: Provided,however, that if the Lessor requires such restoration, the Lessor shall give written notice thereof to the Lessee 60 days before the termination of the lease.

CC Form-38 (Reverse)
(4-2-54)

LEASE OF PROPERTY

8. The Lessor grants and gives the Lessee xx the option as a consideration of this lease and for the further consideration of one dollar, the receipt of which is hereby acknowledged, to renew said lease for a period of _____ years from the Lessor, his heirs, executors, administrators, and assigns, for the sum of XXXX Dollars (XXXX) per year.

9. As a consideration of this lease and for the further consideration of one dollar, the receipt of which is hereby acknowledged, the Lessor grants and gives the Lessee the option at any time while this lease is in effect, to purchase said property from the Lessor, his heirs, executors, administrators, and assigns, ~~for the amount of~~ by appraisal Dollars ($_____). In the event the Lessee shall exercise this option to purchase said property, the Lessor agrees to furnish at his own expense an abstract of title, certificate of title, or other evidence of title satisfactory to CCC and to execute a good and sufficient warranty deed conveying fee simple title to said property free and clear of all taxes, liens, or encumberances except for the following, and no others.

10. In the event any increased tax assessment is made against the Lessor or the property by virtue of the erection of storage structures and facilities thereon by the lessee, the lessor agrees to cooperate fully in any contest of such increased assessment which the lessee feels should be made. The Lessee agrees that the rental hereunder shall be adjusted upward by the amount of any such increased tax assessment which the Lessor and Lessee mutually agree to be proper or which is determined to be legally valid in court proceedings.

11. No member of or Delegate to Congress or REsident Commissioner, shall be admitted to any share or part of this lease or purchase or to any benefit that may arise therefrom, but this provision shall not be construed to extend to this lease or purchase if made with a corporation for its general benefit.

12. The Lessor warrants that he has not employed any person to solicit or secure this lease upon any agreement for a commission, percentage, brokerage, or contingent fee and that no such consideration or payment has been or will be made. Breach of this warranty shall give CCC the right to annul the lease, or, in its discretion, to deduct from the rental or purchase price the amount of such commission, percentage, brokerage, or contingent fees. This warranty shall not apply to commissions payable by the Lessor if the lease is secured or made through a bona-fide agent maintained by the Lessor for the purpose of leasing or selling his property.

(Seal) F.W.Volkman, LESSOR
(Seal) Grace Volkman , Lessor
(Seal) _____ Lessor

COMMODITY CREDIT CORPORATION, LESSEE.
By Harry T. Heater
Chairman,Frontier County ASC Committee.
(Seal)

Sworn to before me. F.J.Timm,Notary Public

CC Form-38 U.S. DEPARTMENT OF AGRICULTURE

F. W. & Grace Volkman
to
COMMODITY CREDIT CORP.
Filed September 12, 1959
at 11:15 A.M., and recorded
in Book 20 Misc. Page 788.
Louis M. Hovey,
County Clerk.

EXTENSION OF LEASE

"THIS EXTENSION OF LEASE made and entered into this 10 day of Sept. 1959 by and between Fred W. Volkman, hereinafter called Lessor, and Commodity Credit Corporation, hereinafter called Lessee.

WITNESSETH

WHEREAS, the parties hereto have heretofore entered into a certain lease dated Sept.10,1954, wherein the Lessor leased to the Lessee the following described property:

Part of the West 1/2 of the south east 1/4 of Section 15 Township 8 Range 24 containing 2.0 acres, more or less.

for a term ending October 1, 1959 and

WHEREAS, it is desired by the parties hereto to extend the said lease for an additional term under the same terms and conditions:

NOW, THEREFORE, it is mutually understood and agreed by and between the parties hereto as follows:

1. The said lease is hereby extended for an additional term beginning October 1,1959 and ending October 1, 1964.
2. Lessors grant and give to the Lessee the option of further renewal of the lease for an additional period of five (5) years ending Oct. 1, 1969, under the same terms and conditions of the lease as extended herein provided the Lessee gives the Lessors written notice to renew at least thirty (30) days prior to the time the lease, as extended, would otherwise expire.

IN WITNESS WHEREOF, the parties hereto have executed this Extension of Lease on the day first above written.

F.W. Volkman
(Lessor)
Grace Volkman
(Lessor's Spouse)
COMMODITY CREDIT CORPORATION
By Charley E. Davis
Contracting Officer

Fred & Grace Volkman
to
Commodity Credit Corporation
Filed March 23, 1964
at 10:45 o'clock A. M.
and Recorded in Book 27
of Misc. at Page 720.
Louis N. Hovey
County Clerk

FORM CCC GRAIN-19
(12-9-63)

U. S. DEPARTMENT OF AGRICULTURE
Agricultural Stabilization and Conservation Service
Commodity Credit Corporation
LEASE OF PROPERTY

THIS LEASE, made and entered into this ___ day of _____, 19__ by and between Fred W. Volkman of Eustis, Nebraska (hereinafter the "Lessor"), and Commodity Credit Corporation, (hereinafter called the "

WITNESSETH THAT:

1. The Lessor leases to the Lessee, and the Lessee hereby leases from the Lessor, upon the terms and co hereinafter stated, the following described real estate (hereinafter called "property") situated in the Coun Frontier and State of Nebraska (Enter here a complete legal description of the site)

Part of the west ½ of the south east ¼ of Section 15, Township 8, Range 24

containing 2.0 acres, more

2. The term of the lease shall be for a period of 5 years, commencing the 1st day of October 19 and ending the 30th day of September, 19 69, with the right of the Lessee, at any time during such te any extension thereof, to terminate said lease, and liability for any further rent, by giving 30 days' previ in writing to the Lessor.

3. As rent for said property, the Lessee shall pay the Lessor One Hundred Fifty Dollars ($ 150.00 per year, such rent to be payable in advance, but to be apportionable in the event the lease is terminated as provided in paragraph 2 hereof.

4. The Lessor warrants that he is the owner of the property, has the right to give the Lessee possessio this lease, and will, so long as this lease remains in effect, warrant and defend the Lessee's possession aga any and all persons whomsoever.

5. The Lessee shall have the right, during this lease, to erect storage structures or facilities, make al install scales, fences, or signs, in or upon the premises hereby leased and, at the expiration of said lease or renewal or extension thereof or at any time this lease is in effect, may remove said storage structures, facili scales, fences or signs or any part thereof, whether or not such structures, facilities, scales, fences or sign become legally a fixture.

6. The Lessee shall not assign this lease without the written consent of the Lessor. The Lessee, may, ho sublet the structures on the premises leased hereunder, or any one or more of them for the term of the lease or part thereof upon such terms and conditions as Lessee may wish to so sublet.

7. The Lessee, if required by the Lessor, shall upon the expiration of this lease, restore the premises t same condition as that existing at the time of first entering upon the same under this lease or under any prior from the Lessor to the Lessee which has been continuous, reasonable and ordinary wear and tear and damages by th elements or by circumstances over which the Lessee has no control excepted: Provided, however, That if the Lesse requires such restoration, the Lessor shall give written notice thereof to the Lessee 60 days before the term of the lease.

8. The Lessor grants and gives the Lessee the option as a consideration of this lease and for the further consideration of one dollar, the receipt of which is hereby acknowledged, to renew said lease for a period of years from the Lessor, his heirs, executors, administrators, and assigns, for the sum of One Hundred Fifty Doll ($ 150.00) per year.

9. As a consideration of this lease and for the further consideration of one dollar, the receipt of which hereby acknowledged, the Lessor grants and gives the Lessee the option, at any time while this lease is in effec to purchase said property from the Lessor, his heirs, executors, administrators, and assigns, ~~xxxxxxxxxxxxxx~~ F Appraisal Dollars ($). In the event the Lessee shall exercise this option to purchase said property, the Lessor agrees to furnish at his own expense an abstract of title, certificate of title, or other evidence of title satisfactory to CCC and to execute a good and sufficient warranty deed conveying fee simple ti to said property free and clear of all taxes, liens, or encumbrances except for the following, and no others.

FORM CCC GRAIN-19 (REVERSE)

10. In the event any increased tax assessment is made against the Lessor or the property by virtue of the erection of storage structures and facilities thereon by the Lessee, the Lessor agrees to cooperate fully in any contest of such increased assessment which the Lessee feels should be made. The Lessee agrees that the rental hereunder shall be adjusted upward by the amount of any such increased tax assessment which the Lessor and Lesse mutually agree to be proper or which is determined to be legally valid in court proceedings.

11. No member of or Delegate to Congress or Resident Commissioner, shall be admitted to any share or part this lease or purchase or to any benefit that may arise therefrom, but this provision shall not be construed to extend to this lease or purchase if made with a corporation for its general benefit.

12. The Lessor warrants that he has not employed any person to solicit or secure this lease upon any agree for a commission, percentage, brokerage, or contingent fee and that no such consideration or payment has been or will be made. Breach of this warranty shall give CCC the right to annul the lease, or, in its discretion, to de from the rental or purchase price the amount of such commission, percentage, brokerage, or contingent fees. Thi warranty shall not apply to commissions payable by the Lessor if the lease is secured or made through a bona-fid agent maintained by the Lessor for the purpose of leasing or selling his property.

COMMODITY CREDIT CORPORATION, LESSEE

(Seal) x Fred Volkman, LESSOR

By Stanley Dodson

(Seal) x Grace Volkman, LESSOR

Chairman, Frontier ASC County Commit
Contracting Officer

_____, WITNESS

ACKNOWLEDGMENT

State of Nebraska)
) ss:
County of Frontier)

On this 31 day of March, 19 68, before me a Notary Public in and for said county personally came the above-named Fred W. Volkman and Grace Volkman who is personally known to me to be the identical person(s) who name(s) are affixed to the above instrument as Lessor and they acknowledged said instrument to be their voluntary act and deed. Witness my hand and notarial seal, the date last aforesaid.

My Commission expires on the 20 day of March, 19 68.

(NOTARY SEAL)

Ella E. Pavel Notary Publ

Commodity Credit Corporation
To
Fred Volkman & Grace Volkman
Filed: October 29, 1964 at 10 o'clock and 45 minutes A.M. and recorded in book 29 of Misc. Page 161.

Louis M. Hovey
County Clerk

RELEASE OF BIN SITE LEASE

WHEREAS, on October 1, 1964 Fred Volkman and Grace Volkman (hereinafter called Lessor) leased to Commodity Credit Corporation (hereinafter called Lessee) the following described property in the State of Nebraska, County of Frontier:

Part of the west ½ of the south east ¼ of Section 15, Township 8, Range 24

WHEREAS, said lease was recorded in the real estate records of said County in Book 27 of Miscellaneous at Page 720; and

WHEREAS, the Lessor and Lessee do hereby agree that the terms of said lease have been performed and satisfied.

NOW, THEREFORE, in consideration of the premises, the Lessor and Lessee do hereby acknowledge that said lease is and shall be of no further force and effect and do hereby release the same.

This release is effective the date last hereafter executed by the parties hereto. This instrument is executed for and on behalf of Lessee pursuant to delegation of Authority published in the Federal Register, 26 F.R. 3900; 27 F.R. 1562.

LESSOR:

x Fred Volkman

x Grace Volkman

Date: October 22, 1964

(NOTARY SEAL)

COMMODITY CREDIT CORPORATION, Lessee
By Joseph A Tranch
State Executive Director
Nebraska ASC State Committee
Lincoln, Nebraska
Contracting Officer
Date: October 26, 1964

ACKNOWLEDGMENT

Subscribed to and signed before me this 26th day of October, 19 64.

Patricia K. Anderson
Notary Public
My commission expires August 8, 1968

State of Nebraska)
) ss:
County of Frontier)

On this 22nd day of October, 19 64, before me a Notary Public in and for said county personally came the above-named Fred Volkman and Grace Volkman who are personally known to me to be the identical person(s) whose name(s) are affixed to the above instrument as Lessor and they acknowledged said instrument to be their voluntary act and deed. Witness my hand and notarial seal, the date last aforesaid.

My Commission expires on the 1st day of October, 19 65.

Walter Hueftle Notary Public

(NOTARY SEAL)

Environmental Science Division
Argonne National Laboratory
9700 South Cass Avenue, Bldg. 203
Argonne, IL 60439-4843
www.anl.gov

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