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HydroGeoLogic, Inc
Exceeding Expectations

Kansas City Operations

GARVEY ELEVATOR SITE
WORK PLAN AND FIELD SAMPLING PLAN ADDENDUM FOR REMEDIAL INVESTIGATION ACTIVITIES

TO: Brian Zurbuchen, PhD, EPA Task Order Project Officer
FROM: [redacted] P.G., HGL [redacted]
THROUGH: [redacted], HGL Program Manager
DATE: February 23, 2010
SUBJECT: Work Plan Addendum for Remedial Investigation Activities, Garvey Elevator Superfund Site, Hastings, Nebraska
CONTRACT NO: EP-S7-05-05
TASK ORDER NOs: 0033 and 0034

HydroGeoLogic, Inc. (HGL) is conducting Remedial Investigation/Feasibility Study (RI/FS) activities at the Garvey site in Hastings, Nebraska (Site). This work is being executed under U.S. Environmental Protection Agency (EPA) Region 7 Architect and Engineering Services (AES) Contract No. EP-S7-05-05, Task Orders 0033 0034.

This Addendum has been prepared to address specific revisions to the EPA-approved Revised Final Work Plan, dated June 25, 2009 (HGL, 2009), that includes the site-specific Field Sampling Plan (FSP) and Quality Assurance Project Plan (QAPP). The revisions presented in this Addendum address the drilling, installation, and sampling of permanent monitoring wells. The Revised Final Work Plan is incorporated by reference into this Addendum. Other than the specific modifications discussed in this Addendum, all other work at the Site will be conducted in accordance with the EPA-approved planning documents noted above. Information pertaining to the location, description, past practices, and physical characteristics of the site are provided in the Revised Final Work Plan and, therefore, are not repeated in this Addendum.

RI field work is under way at the site. Direct-push technology (DPT) was employed over the course of two field events to collect subsurface data and to aid in determination of locations for permanent monitoring wells. The initial DPT field activities were conducted in August and September 2009 and additional DPT work was conducted in December 2009. The EPA task order project officer (TOPO) and HGL project team completed a comprehensive review of the subsurface data collected during the DPT data acquisition phase of the RI and existing monitoring well and transect data, and discussed the scope of subsequent investigative activities. The team determined that the monitoring well installation and construction procedures described below will be followed for installing the permanent monitoring wells needed to support the RI/FS. The rationale for the placement, screen depths, and number of proposed permanent off-site monitoring wells is discussed in detail in the following subsections.

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ADDITIONAL OFF-SITE MONITORING WELLS

The following discussion revises Work Plan Section 6.3.2.1 and FSP Section 2.2.2.1. Well identification descriptors are used for the proposed monitoring wells to indicate their general screened interval within the aquifers beneath the off-site area.

C-Zone: Completed above the lower fine-grained unit; in areas were this unit was observed during the EC logging the upper surface was encountered at elevations ranging from approximately 1,762 feet to 1,745 feet above mean sea level (amsl).

D-Zone: Completed below the lower fine-grained unit below an approximate elevation of 1,760 feet amsl, and above an elevation of approximately 1,700. In the instance where there are two D-zone wells at a location, the following designations are used – D1 for the well with the higher elevation screened interval; and D2 for the lower elevation screened interval.

E-Zone: These wells are screened near the base of the unconsolidated aquifer below elevations of 1,700 feet amsl.

These descriptors are generally consistent with those used for existing Garvey Elevator monitoring wells; although the proposed E-zone wells are shallower than the existing E-zone wells which were generally screened immediately above the bedrock surface. Also, the D1 and D2 descriptors have been added because more than one well at a location may be screened in the lower aquifer, but not near the bedrock surface where the E-zone descriptor would apply.

As described above, the placement of the screened interval for each proposed monitoring well is keyed to elevation amsl. The transect groundwater results were referenced to elevation amsl to account for variations in ground surface elevation between the site and the farthest downgradient transect (Transect 4) located approximately 4.6 miles to the east-southeast along Technical Boulevard. The proposed off-site monitoring wells are illustrated on Figure 1 along with pertinent existing monitoring wells and the off-site transects for both the Highway 6 & Highway Site RI and the Garvey Elevator Site. Table 1 lists the proposed monitoring wells and their approximate depths. The proposed monitoring wells and investigation rationale for each are as follows:

MW-12D: MW-12D will assist with the evaluation and monitoring of the lower aquifer at an existing A/C-zone well location. No D-zone well is present in this center-north portion of the plume nearer to the site. This well will be installed to a depth of 167 feet to 177 feet below ground surface (bgs).

MW-18D1: Another lower aquifer well will be installed at this A/C/D-zone well location just south of the centerline of the plume. Based on the DPT transect data, the existing wells do not evaluate the vertical center of the contaminated groundwater plume. MW-18D1 will be installed such that it screens the lower aquifer from 1750 feet to 1740 feet amsl. It is identified as a D1-well

because it will screen a higher elevation than the existing D-zone monitoring well.

MW-41D1/D2: These two wells will monitor the south boundary of the plume along Wabash Avenue to supplement West Highway 6 & Highway 281 Site wells MW-104A/C/D (north of plume boundary) and MW-105A/C/D (northern edge of plume center at Wabash Avenue). Both wells will be screened in the lower aquifer D-zone at elevations of 1755 feet to 1745 feet amsl (MW-41D1) and 1720 feet to 1710 feet amsl (MW-41D2). The screened zones of these two wells will vertically target the approximate elevation of the plume core as projected from the north.

MW-42D/E: These two monitoring wells will be located in the middle of the plume along Showboat Boulevard to supplement West Highway 6 & Highway 281 Site wells MW-106A/C/D (north plume boundary). The MW-42 well cluster will be placed approximately 400 feet south of Transect 2 boring TS2-04 (one-third of the distance from TS2-04 to TS-05). Both wells will be screened in the lower aquifer D-zone at elevations of 1728 feet to 1718 feet amsl (MW-42D) and 1698 feet to 1688 feet amsl (MW-42E). These screened elevations vertically target the approximate upper and middle portions of the contaminant plume based on the transect data.

MW-43D/E: These two lower aquifer wells will monitor the south boundary of the plume along Showboat Boulevard. This well cluster will be placed approximately 440 feet north of Transect 2 boring TS2-07 (one-third of the distance from TS2-06 to TS2-07). The wells will be completed in the D-zone and the E-zone at elevations of 1728 feet to 1718 feet amsl (MW-43D) and 1698 feet to 1688 feet amsl MW-43E. These screened elevations are the same as for the proposed MW-42 wells in the center of the plume to the north.

MW-44D/E: This well cluster will monitor conditions downgradient of the plume and will be situated approximately 620 feet south of Transect 4 boring TS4-01 (500 feet south of initial MW-45 location) along Technical Boulevard. These monitoring wells will be completed in the lower aquifer D-zone and E-zone at elevations of 1702 to 1692 feet amsl (MW-44D) and 1682 feet to 1672 feet amsl (MW-44E). Based on the Transect 3 data, the contaminated groundwater would most likely be found at these elevations as the plume migrates downgradient.

MW-45C/D: This well cluster location will lie closer to the site than either the MW-18 or MW-12 well clusters and between those wells along the centerline of the plume. These two monitoring wells will assist in characterizing the contaminant plume along the centerline of the plume downgradient of the site. This area has been a data gap when mapping the plume configuration. Because these wells will be situated nearer the site, analytical results from

these wells also will be used to evaluate the longer-term effectiveness of the source control measures. The site sources are upgradient approximately 3,300 feet to the west-northwest. The C-zone well will be screened at an elevation of 1772 feet to 1762 feet amsl, which coincides with the screen elevation for MW-17C. The groundwater sample from this well in April 2009 contained 130 J micrograms per liter (μg/L) of carbon tetrachloride. The D-well will be screened at the same elevation as the proposed MW-12D and MW-18D1 at 1750 feet to 1740 feet amsl.

MW-46D1/D2: This well cluster is located at the approximate southern margin of the centerline of the plume along Wabash Avenue at the boring TS1-02 location. These wells would vertically monitor the core of the contaminant plume at elevations at elevations of 1755 feet to 1745 feet amsl (MW-46D1) and 1720 feet to 1710 feet amsl (MW-46D2). These elevations are the same as those of MW-41D1/D2 at the southern boundary along Wabash Avenue to the south.

Monitoring Well Installation Methods and Procedures

Procedures and methods specific to the additional monitoring well installation activities described in this Addendum, and not already described in the above-referenced planning documents, are detailed in the subsections below. Other than the specific well installation activities discussed in this Addendum, all procedures for collecting groundwater samples, conducting data validation, managing site-derived data, and developing reports are detailed in that approved Work Plan (HGL, 2009).

Figure 2 is a construction diagram for 2-inch monitoring wells. Before mobilizing for the well installation, ground surface elevations will be surveyed at each proposed well location. Survey data will be used to determine the drilling depths required to screen particular elevations within the aquifer at each proposed location.

Well Installation

The monitoring well installation procedures are as follows:

1. Using the mud rotary drilling method, a 6-inch diameter outside diameter (OD) borehole will be advanced to depth necessary to install the screen at the appropriate elevation.
2. The 2-inch schedule 80 polyvinyl chloride (PVC) well casing and factory-slotted 10-foot screen (0.020-inch slot) will be lowered into the borehole so that the screen top and bottom coincide with the pre-determined depths to match the proposed screened interval elevations.
3. Filter pack sand with a #16-#30 gradation will be placed into the annular space, against the screen to a point approximately three feet above the top of the screen.
4. A 3-foot bentonite chip seal will then be placed in the annular space between the boring wall and the 2-inch well casing above the filter pack.
5. High-solids bentonite grout will be emplaced using a side-discharge tremie pipe from the top of the chip seal to within 3 feet of the ground surface.

6. The wellhead will be secured within a lockable steel stickup well protector set in a 2-foot by 2-foot concrete pad and extending to approximately 2.5 feet above the ground surface. Steel bollards will be installed around the well pad. Alternatively, if a stickup completion is not allowed, a circular, bolt-type flush-mounted security well vault will be cemented in the center of the well pad.

The wells will be developed in accordance with Section 3.4.2 of the FSP.

The HGL geologist will log the drilling cuttings and supplementary split-spoon samples from the deepest borehole to be drilled at each well cluster. Otherwise, the lithologic logging will be conducted in accordance with Section 3.4.4 of the FSP.

Geotechnical Sample Collection

Split-spoon samplers will be employed to collect geotechnical samples, because Shelby tubes have been largely ineffective for use in the formations underlying the site area. Also, mud rotary drilling requires that the drill string and bit be removed each time a Shelby tube sample is collected. However, split-spoons can be collected through the drill string out the end of the bit using the wire-line in-hole split-spoon sampling method. This sampling method will decrease the time involved in collecting the samples, which lowers the sampling costs.

Although split-spoon samplers are not considered by American Society for Testing and Materials (ASTM) to be thin-wall samplers; their use in this instance will provide a cost-efficient sample for approximate physical properties without endangering borehole wall stability by removing the drill string each time a sample is collected.

Therefore, 2-inch diameter, 24-inch long split spoon samples will be collected as necessary from the deepest borehole drilled at each well location for both lithologic logging and geotechnical analysis. Table 2 lists the wells and number of split-spoon samples, and natural oxidant demand samples, proposed for collection during the well installation effort. The geotechnical analyses are detailed in the June 2009 Final Work Plan, and also are provided on Table 2.

Monitoring Well Sampling

Table 3 of this Addendum revises Table 6.3 of the Final Work Plan to include the newly proposed off-site monitoring wells. Table 4 revises Table 2.6 of the Final FSP pertaining to sampling of existing and newly installed monitoring wells. This Addendum also revises Section 6.3.2.2 of the June 2009 Revised Final Work Plan to include four rounds of sampling of new and existing off-site monitoring wells (OU2). The sample collection procedures are described in the June 2009 Final FSP.

INVESTIGATION-DERIVED WASTE MANAGEMENT

The following procedures for managing investigation-derived waste (IDW) addend those outlined in Section 4.0 of the Final FSP.

Liquid IDW

Liquid IDW will consist primarily of well development purge water and drilling fluids (water and drilling mud) brought back to the site from each well location. Initially, these fluids will be containerized in a 22,000-gallon Baker® tank on site. After suspended solids have settled out, the water will be decanted into poly tanks. Periodically, the poly tanks will be emptied by a licensed waste hauler and the liquid IDW transported by to the city of Hastings wastewater treatment plant for disposal. Decontamination fluids will be pumped from the decontamination pad directly into the poly tanks for disposal.

Solid and Semi-solid IDW

This IDW consists of the drilling spoils, and drilling mud and formational fines remaining after the IDW water is decanted from Baker® tank at the staging area and Baker tanks used by the drillers. These wastes will initially be containerized at the borehole in 55-gallon drums or brought back to the staging area to await disposal. If necessary, 12-cubic yard rolloffs will be brought to the site to combine the soil from the drums. The accumulated cuttings and mud will be disposed of at the Hastings Adams County Landfill. EPA had previously determined that wastes accumulated during CERCLA activities can be disposed in Phase IV of this landfill (EPA, 2009)

REFERENCES

HGL, 2009. Revised Final Work Plan, Remedial Investigation/Feasibility Study, Garvey Elevator Site, Hastings, NE. June.

U.S. Environmental Protection Agency (EPA), 2009, Letter regarding CERCLA Off-Site Rule: Affirmative Determination of Acceptability for the Hastings Adams County Landfill Phase IV, Hastings NE. October 26.

WORK PLAN AND FIELD SAMPLING PLAN
ADDENDUM
REMEDIAL INVESTIGATION/FEASIBILITY STUDY
GARVEY ELEVATOR SITE
HASTINGS, NE
TASK ORDERS 0033/0034

PROJECT: Remedial Investigation/Feasibility Study
Garvey Elevator Site, Hastings, NE

TASK ORDER NUMBERS: 0033/0034

HYDROGEOLOGIC, INC.

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U.S. ENVIRONMENTAL PROTECTION AGENCY – REGION 7

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Table 1
Proposed Monitoring Well Depths
Garvey Elevator Site
Hastings, NE

Proposed Well ID	Ground Elevation (ft amsl)	Top of Screen (ft msl)	Total Depth* (ft amsl)	Top of Screen (ft bgs)	Total Depth (ft bgs)
MW-12D	1,917	1,750	1,740	167	177
MW-18D1	1,911	1,750	1,740	161	171
MW-41D1	1,916	1,755	1,745	161	171
MW-41D2	1,916	1,720	1,710	196	206
MW-42D	1,902	1,728	1,718	174	184
MW-42E	1,902	1,698	1,688	204	214
MW-43D	1,906	1,728	1,718	178	188
MW-43E	1,906	1,698	1,688	208	218
MW-44D	1,885	1,702	1,692	183	193
MW-44E	1,885	1,682	1,672	203	213
MW-45C	1,910	1,772	1,762	138	148
MW-45D	1,910	1,750	1,740	160	170
MW-46D1	1,912	1,755	1,745	157	167
MW-46D2	1,912	1,720	1,710	192	202

Note: The ground elevations upon which the depths below ground surface are based are approximate. The elevation at each proposed well location will be surveyed prior to the start of drilling, and the well depths adjusted as necessary to screen the listed elevation intervals for each well.

* - The total depth is nominally equivalent to the bottom of the screen.

amsl - above mean sea level

bgs - below ground surface

Table 2
Geotechnical Sample Quantities
Off-Site Well Installation Program
Garvey Elevator Site
Hastings, NE

Sample Interval (feet amsl)		Well Locations and Screen Interval (feet amsl)																	
		MW-12D (1750-1740)	MW-18D1 (1750-1740)	MW-41D1 (1755-1745)	MW-41D2 (1728-1710)	MW-42D (1728-1718)	MW-42E (1698-1688)	MW-43D (1728-1718)	MW-43E (1698-1688)	MW-44D (1702-1692)	MW-44E (1682-1672)	MW-45C (1772-1762)	MW45D (1750-1740)	MW46-D1 (1755-1745)	MW-46D2 (1720-1710)	Analytical Sample Container	Analytical Test/ Method	Samples For Analysis (*)	Number of split-spoons
		Sample Quantity Per Interval																	
Geotechnical Sampling																			
Upper Aquitard (1772-1770)																Two 2-inch diameter, 2-foot long sample split-spoons; bagged	Grain Size Distribution (ASTM D 422 & 423) Moisture Content (ASTM D2216-92) Soil Porosity[1] (ASTM D 5084-90) Permeability (ASTM D2434-68 or ASTM D5084) Bulk Density (ASTM D2937)		
Medial Aquifer (1770-1760)		1	1		1		1		1		1		1*		1			1	9
Lower Aquitard (1759-1756)		1	1		1		1*		1		1		1		1			1	9
Lower Aquifer (1755-1745)		1*	1		1		1		1		1		1		1			1	9
Lower Aquifer (1745-1735)		1	1		1		1		1		1		1*		1			1	9
Lower Aquifer (1730-1720)					1		1		1*		1				1			1	6
Lower Aquifer (1720-1710)					1*		1		1		1				1			1	6
Lower Aquifer (1710-1700)	Soil Matrix						1		1		1								3
Lower Aquifer (1700-1690)							1*		1		1							1	4
Lower Aquifer (1690-1680)							1		1		1								2
Lower Aquifer (1680-1670)											1*							1	2
Chemical Sampling																			
Upper Aquitard (1772-1770)																wide mouth 8 oz glass jar; (1 - pH/TOC; 1 - NOD)	Total Organic Content (TOC) EPA SW-846 9060 pH (ASTM D 4972-95) Natural Oxygen Demand (NOD) CAIROX Potassium Permanganete Demand Method		N/A
Medial Aquifer (1770-1760)																			N/A
Lower Aquitard (1759-1756)					1		1											2	N/A
Lower Aquifer (1755-1745)													1					1	N/A
Lower Aquifer (1745-1735)		1																1	N/A
Lower Aquifer (1730-1720)																			N/A
Lower Aquifer (1720-1710)															1			1	N/A
Lower Aquifer (1710-1700)																			N/A
Lower Aquifer (1700-1690)											1							1	N/A
Lower Aquifer (1690-1680)																			N/A
Lower Aquifer (1680-1670)																			N/A

NOTES
* Indicates geotechnical sample collected for laboratory analysis, which requires from 2 to 3 split-spoons per sample depending on the grain size of the sampled material. Single split-spoon samples will be collected for lithologic logging purposes.
[1] Porosity calculated from moisture content, density, and specific gravity.
- Bulk density measurements for coarse grained materials will be difficult to obtain.
- Continuous cores will be collected from HTW-100, MW-101B, MW-102B, MW-103D, MW-104D, MW-105D, MW-106D with geotechnical samples collected from screened intervals as noted in the table. Upper aquifer geotechnical samples will include one sample from the silty clay unit.
- amsl = above mean sea level
- N/A = Not applicable

Table 3
Monitoring Well Sampling Summary
Garvey Elevator Site
Hastings, NE

					EPA Region 7 Laboratory															Field Test Kits							
Sample Location	Operable Unit	Depth	Water Level	GW parameters (T, pH, SC, DO, ORP, turbidity)	VOCs	Alkalinity	Chloride	Methane/Ethane/Ethene	Nitrogen (Nitrate+Nitrite)	Sulfate	Total Organic Carbon	Total Suspended Solids	Total Dissolved Solids	Total Phosphorus	Field Duplicate - VOCs	Field Duplicate - MNA	Field Duplicate Water Quality/PCR	Rinsate Blank	MS/MSD Volume	Ferrous Iron	Carbon Dioxide	Dissolved Oxygen	BART Iron Reducing Bacteria	BART Sulfate Reducing Bacteria	BART Slime Forming Bacteria	BART Denitrifying Bacteria	BART Nitrifying Bacteria
MW-01A	OU1	102-117	X	X	X																						
MW-02A	OU1	103-118	X	X	X																						
MW-03A	OU1	108-123	X	X	X	X	X	X	X	X										X	X	X					
MW-03B	OU1	130.6-133.5	X	X	X	X	X	X	X	X	X	X	X	X						X	X	X	X	X	X	X	X
MW-03D	OU1	171-176	X	X	X	X	X	X	X	X	X	X	X	X						X	X	X	X	X	X	X	X
MW-03E	OU1	230-235	X	X	X	X	X	X	X	X										X	X	X					
MW-04A	OU1	108.5-123.5	X	X	X																						
MW-04B	OU1	127-132	X	X	X																						
MW-05A	OU1	107.5-122.5	X	X	X																						
MW-05B	OU1	129-132	X	X	X																						
MW-05D	OU1	162-167	X	X	X																						
MW-06A	OU1	107.5-122.5	X	X	X																						
MW-06D	OU1	163.5-173.5	X	X	X																						
MW-06E	OU1	217.6-227.6	X	X	X																						
MW-07A	OU1	98-113	X	X	X																						
MW-07B	OU1	130-135	X	X	X																						
MW-08A	OU1	114.5-129.5	X	X	X	X	X	X	X	X										X	X	X					
MW-09A	OU1	101.3-116.3	X	X	X																						
MW-13C	OU1	133-135.5	X	X	X																						
MW-13E	OU1	230.8-235.8	X	X	X																						
MW-19A	OU1	127-132	X	X	X																						
MW-19C	OU1	152-162	X	X	X																						
MW-20A	OU1	127-132	X	X	X																						
MW-20C	OU1	152-162	X	X	X																						
MW-20D	OU1	182-192	X	X	X																						
MW-20E	OU1	222-232	X	X	X																						
MW-30A	OU1	127-132	X	X	X	X	X	X	X	X	X	X	X	X						X	X	X	X	X	X	X	X
MW-30C	OU1	152-162	X	X	X	X	X	X	X	X	X	X	X	X						X	X	X	X	X	X	X	X
MW-30D	OU1	182-192	X	X	X	X	X	X	X	X	X	X	X	X						X	X	X	X	X	X	X	X
MW-30E	OU1	222-232	X	X	X																						
MW-31A	OU1	127-132	X	X	X																						
MW-31C	OU1	152-162	X	X	X																						

Table 3 (continued)
Monitoring Well Sampling Summary
Garvey Elevator Site
Hastings, NE

					EPA Region 7 Laboratory															Field Test Kits							
Sample Location	Operable Unit	Depth	Water Level	GW parameters (T, pH, SC, DO, ORP, turbidity)	VOCs	Alkalinity	Chloride	Methane/Ethane/Ethene	Nitrogen (Nitrate+Nitrite)	Sulfate	Total Organic Carbon	Total Suspended Solids	Total Dissolved Solids	Total Phosporus	Field Duplicate - VOCs	Field Duplicate - MNA	Field Duplicate Water Quality/PCR	Rinsate Blank	MS/MSD Volume	Ferrous Iron	Carbon Dioxide	Dissolved Oxygen	BART Iron Related Bacteria	BART Sulfate Reducing Bacteria	BART Slime Forming Bacteria	BART Denitrifying Bacteria	BART Nitrifying Bacteria
MW-10A	OU2	101.8-116.8	X	X	X																						
MW-10B	OU2	120-130	X	X	X																						
MW-11A	OU2	91-106	X	X	X																						
MW-12A	OU2	102.4-117.4	X	X	X																						
MW-12C	OU2	150-160	X	X	X																						
MW-12D	OU2	new well	X	X	X	X	X	X	X	X	X	X	X	X						X	X	X	X	X	X	X	X
MW-14A	OU2	91-106	X	X	X																						
MW-17A	OU2	84.5-104.5	X	X	X																						
MW-17C	OU2	130-140	X	X	X																						
MW-17D	OU2	190-192.5	X	X	X	X	X	X	X	X										X	X	X					
MW-18A	OU2	97-112	X	X	X	X	X	X	X	X										X	X	X					
MW-18C	OU2	135-140	X	X	X	X	X	X	X	X	X	X	X	X						X	X	X	X	X	X	X	X
MW-18D1	OU2	new well	X	X	X	X	X	X	X	X	X	X	X	X						X	X	X	X	X	X	X	X
MW-18D2	OU2	188-193	X	X	X	X	X	X	X	X	X	X	X	X						X	X	X	X	X	X	X	X
MW-41D1	OU2	new well	X	X	X																						
MW-41D2	OU2	new well	X	X	X																						
MW-42D	OU2	new well	X	X	X	X	X	X	X	X	X	X	X	X						X	X	X	X	X	X	X	X
MW-42E	OU2	new well	X	X	X	X	X	X	X	X	X	X	X	X						X	X	X	X	X	X	X	X
MW-43D	OU2	new well	X	X	X																						
MW-43E	OU2	new well	X	X	X																						
MW-44D	OU2	new well	X	X	X	X	X	X	X	X										X	X	X					
MW-44E	OU2	new well	X	X	X	X	X	X	X	X										X	X	X					
MW-45C	OU2	new well	X	X	X	X	X	X	X	X	X	X	X	X						X	X	X	X	X	X	X	X
MW-45D	OU2	new well	X	X	X	X	X	X	X	X	X	X	X	X						X	X	X	X	X	X	X	X
MW-46D1	OU2	new well	X	X	X	X	X	X	X	X	X	X	X	X						X	X	X	X	X	X	X	X
MW-46D2	OU2	new well	X	X	X	X	X	X	X	X	X	X	X	X						X	X	X	X	X	X	X	X
*MW-104A	OU2	100-115	X	X	X																						
*MW-104C	OU2	160-180	X	X	X																						
*MW-104D	OU2	192-212	X	X	X																						
*MW-105A	OU2	108-123	X	X	X	X	X	X	X	X										X	X	X					
*MW-105C	OU2	159.5-179.5	X	X	X	X	X	X	X	X										X	X	X					
*MW-105D	OU2	192-212	X	X	X	X	X	X	X	X										X	X	X					
*MW-106A	OU2	114-129	X	X	X																						
*MW-106C	OU2	161-181	X	X	X																						
*MW-106D	OU2	192-212	X	X	X																						
Total			67	67	67	25	25	25	25	25	15	15	15	15	4	3	1	2	2	25	25	25	15	15	15	15	15

* indicates W. Highway 6 & 281 Site monitoring wells

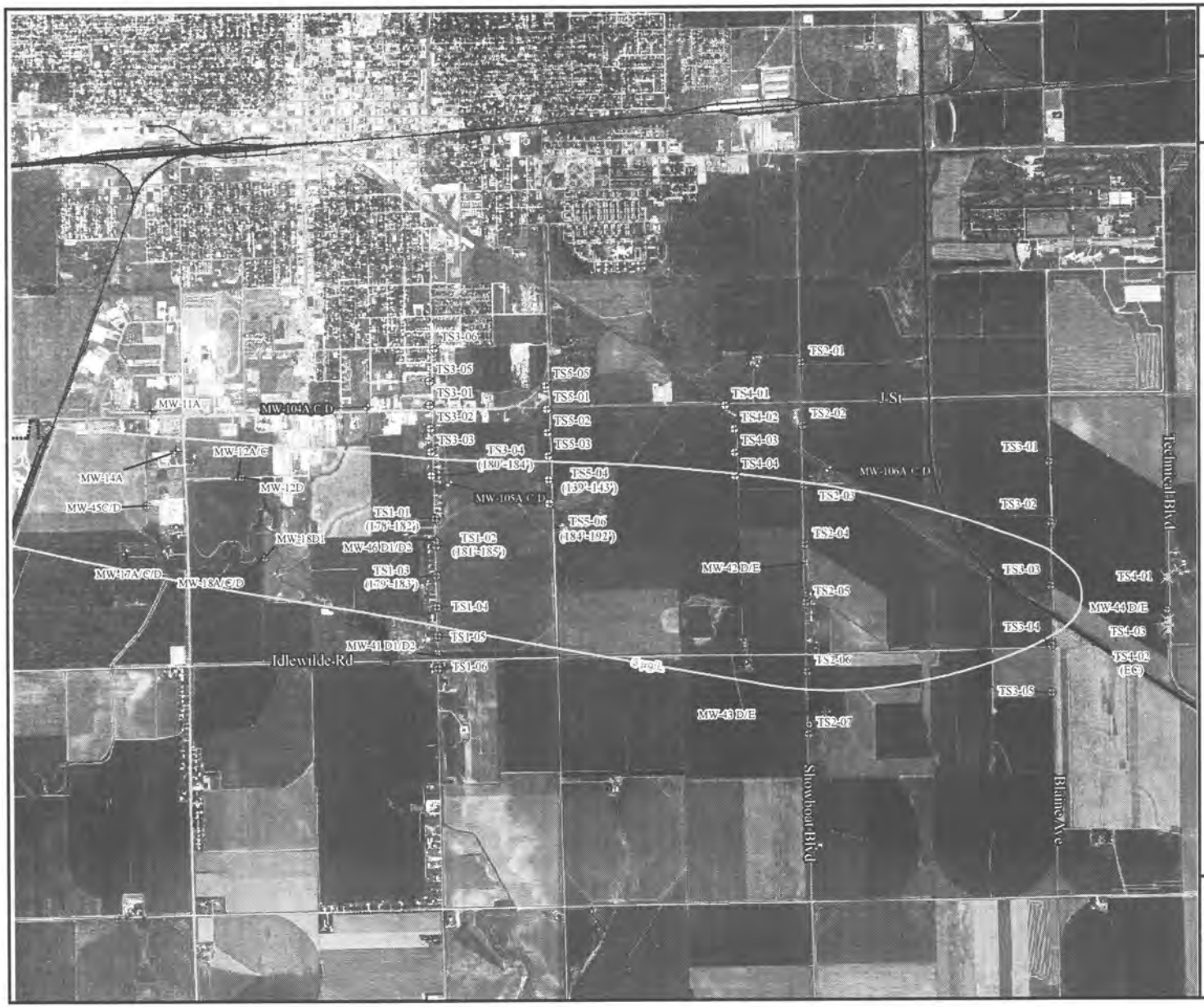
Table 4
OU2 Groundwater Sample Quantities
Garvey Elevator Site
Hastings, NE

Sample Locations	No. of Samples	Analysis
New Monitoring Wells		
MW-12D	1	VOCs, Treatment Evaluation Parameters[1], MNA[2]
MW-18D1	1	VOCs, Treatment Evaluation Parameters[1], MNA[2]
MW-41D1	1	VOCs
MW-41D2	1	VOCs
MW-42D	1	VOCs, Treatment Evaluation Parameters[1], MNA[2]
MW-42E	1	VOCs, Treatment Evaluation Parameters[1], MNA[2]
MW-43D	1	VOCs
MW-43E	1	VOCs
MW-44D	1	VOCs, MNA[2]
MW-44E	1	VOCs, MNA[2]
MW-45C	1	VOCs, Treatment Evaluation Parameters[1], MNA[2]
MW-45D	1	VOCs, Treatment Evaluation Parameters[1], MNA[2]
MW-46D1	1	VOCs, Treatment Evaluation Parameters[1], MNA[2]
MW-46D2	1	VOCs, Treatment Evaluation Parameters[1], MNA[2]
Total Investigation Samples	**14**	
Number of Duplicates	**2**	
Number of MS/MSD	**1**	
Number of Trip Blanks	**1**	
Number of Rinsate Blanks	**1**	
Total of Samples	**19 x 4 Rounds**	
Existing Monitoring Wells and Irrigation Wells		
MW-10A	1	VOCs
MW-10B	1	VOCs
MW-11A	1	VOCs
MW-12A	1	VOCs
MW-12C	1	VOCs
MW-14A	1	VOCs
MW-16A	1	VOCs
MW-16C	1	VOCs
MW-17A	1	VOCs
MW-17C	1	VOCs
MW-17D	1	VOCs, MNA2

Table 4 (continued)
OU2 Groundwater Sample Quantities
Garvey Elevator Site
Hastings, NE

Sample Locations	No. of Samples	Analysis
Existing Monitoring Wells and Irrigation Wells (continued)		
MW-18A	1	VOCs, MNA[2]
MW-18C	1	VOCs, Treatment Evaluation Parameters[1], NA[2]
MW-18D	1	VOCs, Treatment Evaluation Parameters[1], NA[2]
MW-104A	1	VOCs
MW-104C	1	VOCs
MW-104D	1	VOCs
MW-105A	1	VOCs, MNA[2]
MW-105C	1	VOCs, MNA[2]
MW-105D	1	VOCs, MNA[2]
MW-106A	1	VOCs
MW-106C	1	VOCs
MW-106D	1	VOCs
Irrigation Well 1	1	VOCs
Irrigation Well 2	1	VOCs
Irrigation Well 3	1	
Total Investigation Samples	**26**	
Number of Duplicates	**3**	
Number of MS/MSD	**2**	
Number of Trip Blanks	**1**	
Number of Rinsate Blanks	**1**	
Total of Samples	**27 x 4 Rounds**	

Notes:
[1)] TSS, TDS, total P, BART test kits, solvent degrading bacteria
[2)] alkalinity, chloride, sulfate, phosphates, iron, manganese, nitrates, total organic carbon (TOC), and methane, ethane, and ethene.
MS/MSD= matrix spike/matrix spike duplicate
VOCs= volatile organic compounds



HGL—Work Plan Addendum,
Garvey Elevator Site—Hastings, NE

Figure 1
Proposed Off-Site Well Locations

Legend

- Site Boundary
- Former Steel Grain Bin
- Railroad
- Carbon Tetrachloride 5 µg/L Isoconcentration Line
- ⊕ Garvey Elevator Transect Boring (Phase I)
- ⊕ West Highway 6 & Highway 281 Sample Location
- Transect Boring Location (Phase II)
- TS1-01 Sample Location with Carbon Tetrachloride above 5 µg/L
- (EC) Electrical Conductivity to 170
- µg/L Micrograms per liter
- Monitoring Well
- Proposed Monitoring Well Location

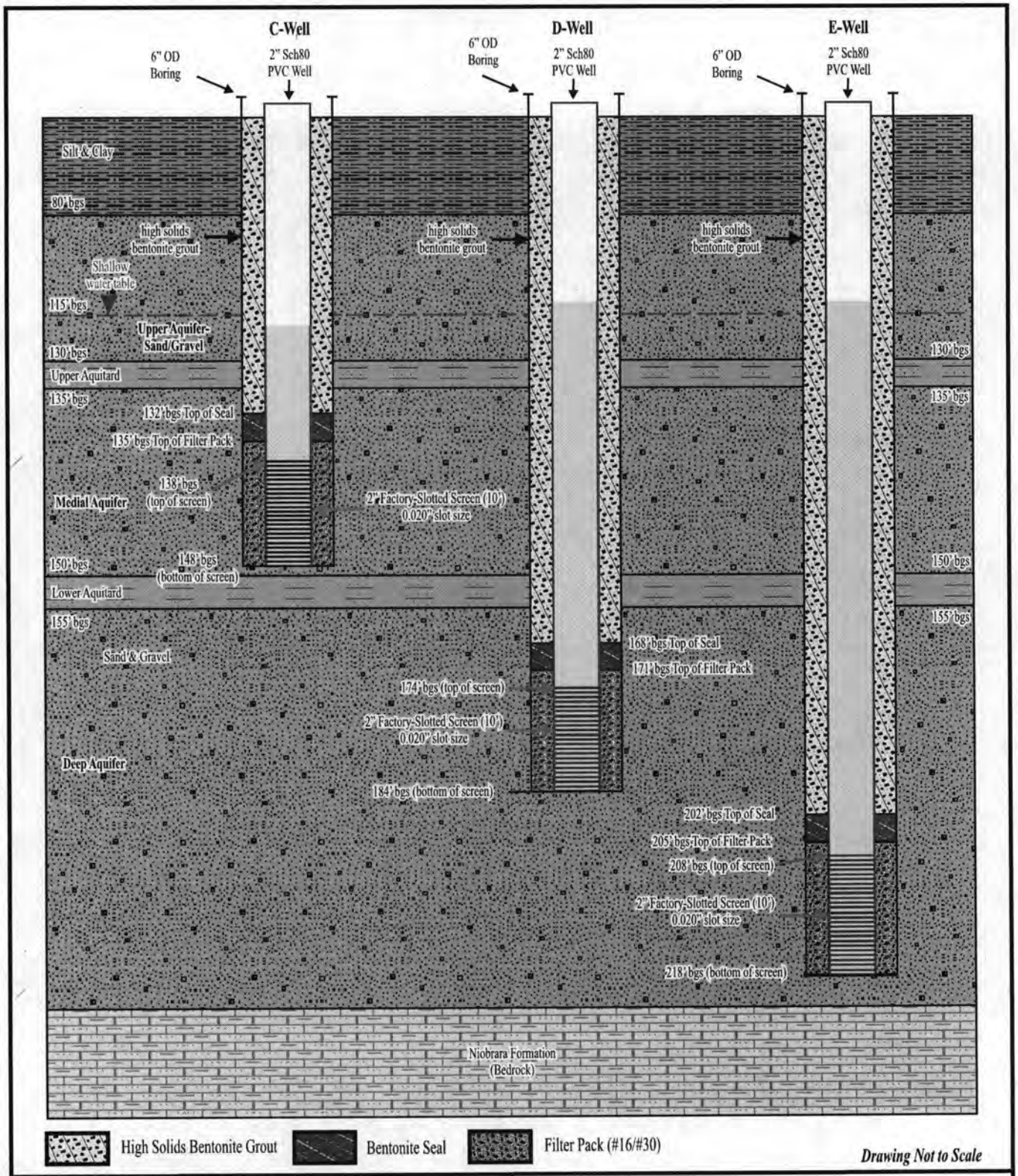
Note
Isoconcentration contour is based on results from DPT samples collected between 198' to 209' bgs (lower aquifer) unless other wise noted

N

0 1,050 2,100 4,200
Feet

Filename: X:\EPA009\Garvey\Work_Plan\Addendum\Proposed_OffSite_Well_Locations.mxd
Project: EP9034.01.22.02.02
Revised: 02/19/10 CV
Source: ENSR GDB 2008, DNR

HGL CDM



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Project: EP9034.01.22.02.02
Revised: 02/12/10 CV
Source: ESRI StreetMap USANebraska DNR

Note:
Well depths will vary depending on the elevation to be screened and the ground surface elevation at a particular location.

HGL HydroGeoLogic, Inc

Figure 2
Proposed Off-Site Monitoring Wells Construction Diagram
Garvey Elevator Site—Hastings, NE