

Site: South Landfill  
ID #: NHD 980862668  
Depth: 3.3 SLF  
Other: MK  
8/95

**WELL INSTALLATION TECHNICAL MEMORANDUM**


for the

**SOUTH LANDFILL  
OPERABLE UNIT NUMBER 5**

**August 1995**

**HASTINGS GROUND WATER  
CONTAMINATION SITE  
HASTINGS, NEBRASKA**

**ARCS Contract No. 68-W9-0025  
Work Assignment No. 56-7LMG**

 **MORRISON KNUDSEN CORPORATION**  
**Engineering, Construction & Environmental Group**  
**7100 East Belleview Avenue, Suite 300**  
**Englewood, Colorado 80111**



40010114  
SUPERFUND RECORDS

**FIELD INVESTIGATION RESULTS  
SOUTH LANDFILL GROUND WATER OPERABLE UNIT NUMBER 5**

**TABLE OF CONTENTS**

<b><u>Section</u></b>	<b><u>Title</u></b>	<b><u>Page</u></b>
1.0	INTRODUCTION	1
2.0	FIELD INVESTIGATION SUMMARY	2
2.1	Monitoring Well Locations	2
2.2	Methodology	2
2.3	Well Completion Depths and Construction Data	4
2.4	Well Development Technique	4
2.5	Disposal of Investigation-Derived Wastes	4
2.6	Well Survey	5
2.7	Monitoring Well Ground Water Samples	5
2.8	Water Level Collection	5
3.0	REFERENCES	6

**Figures**

- 1-1 Hastings Ground Water Contamination Site
- 2-1 Monitoring Well Locations

**Tables**

- 2-1 Summary of Sample Depths (Soil and Ground Water)
- 2-2 In-situ Sample Results - Field GC and EPA Laboratory Results
- 2-3 Well Completion Data
- 2-4 Survey Data

**Attachments**

- A In-situ Ground Water Results (EPA Laboratory Analytical Data)
- B Well Completion Diagrams and Lithologic Logs
- C NDEQ Flow Chart and Investigation-Derived Waste Disposal Guidelines
- D Investigation-Derived Waste Screening Results
- E Physical Properties Analytical Results

## LIST OF ACRONYMS

ARCS	Alternate Remedial Contract Strategy
ASTM	American Society of Testing and Materials
bgs	Below ground surface
CCl <sub>4</sub>	Carbon Tetrachloride
CEC	Cation-exchange capacity
CLP	Contract Laboratory Program
CME	Central Mine Equipment
DQOs	Data quality objectives
EDB	Ethylene dibromide
EPA	U.S. Environmental Protection Agency
GC/ECD	Gas chromatograph/electron capture detector
gpm	Gallons per minute
MK	Morrison Knudsen Corporation
NDEC	Nebraska Department of Environmental Control (preceded the NDEQ)
NDEQ	Nebraska Department of Environmental Quality
NDOH	Nebraska Department of Health
PCE	Tetrachloroethylene (Perchlor) (Tetrachloroethene)
PCBs	Polychlorinated biphenyls
PID	Photo Ionization Detector
PVC	Polyvinyl chloride (a common plastic used in pipe)
QA/QC	Quality assurance/quality control
QA/SAP	Quality Assurance/Sampling and Analysis Plan
QC	Quality control
RI/FS	Remedial investigation and feasibility study
ROD	Record of Decision
TAL	Target analyte list
TCA	1,1,1-trichloroethane
TCE	Trichloroethylene (trichloroethene)
TCLP	Toxicity Characteristic Leachate Procedure
TDS	Total Dissolved Solids
TEPH	Total Extractable Petroleum Hydrocarbons
TOC	Total organic carbon
TPH	Total petroleum hydrocarbons
VOA	Volatile organic analyte
VOCs	Volatile organic compounds

## **1.0 INTRODUCTION**

This is a summary of the ground water field investigation performed at the South Landfill Subsite of the City of Hastings Ground Water Contamination Site (Figure 1-1). Morrison Knudsen Corporation (MK) performed this work for the United States Environmental Protection Agency (EPA) under EPA Contract Number 68-W9-0025, of the EPA Alternative Remedial Contract Strategy (ARCS) program. Activities performed under this Work Plan are part of the remedial investigation and feasibility study (RI/FS) process, and will lead to development of an interim remedial action Record of Decision (ROD) for the landfill (operable unit 05).

The field investigation performed under this work plan included monitoring well installation, and collection of in-situ physical and chemical samples to characterize the aquifer and ground water contamination. The investigation activities were initiated using monies from the Superfund.

This document describes the technical approach and the field events from well installation through the first round of ground water sampling. As a component of the investigative work undertaken to achieve EPA's goal of issuing an interim ROD for the South Landfill Subsite, the objectives of the initial ground water investigation were to identify contaminants that may be present in the ground water and collect information on the subsurface soils, including geological, physical and chemical data to facilitate the RI/FS process.

## **2.0 FIELD INVESTIGATION SUMMARY**

The field investigation was designed to proceed under two main phases. The first phase involved drilling and installing monitoring wells along with the collection of in-situ ground water and soil samples. The second, extended phase consists of sampling the ground water using the newly installed monitoring wells and associated subsite wells for a total of three quarters. The first set of quarterly samples were collected in July 1995. The methodology of the drilling, well installation and sampling program is presented in this section. Drilling, well installation and in-situ sample collection was performed by J & R Drilling of Des Moines, Iowa, a subcontractor to MK. An MK geologist directed the drilling subcontractor and monitored field crew health and safety.

### **2.1 Monitoring Well Locations**

Monitoring wells were located around the subsite based on a previous soil gas investigation (MK, 1994) performed at the site in which elevated soil gas concentrations of TCE, PCE and TCA were identified. Well SL-1 was located upgradient of the landfill to monitor ground water chemical concentrations entering the site. SL-2 and SL-3 were located in the middle of the landfill to monitor ground water quality immediately downgradient of potential PCE and TCE source areas within the western landfill unit (first lease). Wells SL-4s and SL-5s were sited along the eastern boundary of the landfill as shown in Figure 2-1, to correspond to several areas of elevated soil gas concentrations and to monitor ground water quality downgradient of potential PCE and TCE source areas within the eastern landfill unit (second lease). SL-4d and SL-5d were located on the eastern boundary as twins to SL-4s and SL-5s to monitor the deep portion of the aquifer and to monitor vertical flow gradients between the shallow and deep portions of the aquifer.

### **2.2 Methodology**

The monitoring wells were installed, using hollow stem augers, to monitor the shallow ground water across the subsite and the deep ground water on the downgradient edge of the subsite. Boreholes for wells SL-1, SL-2, SL-3, SL-4d and SL-5d were advanced to total depth using 7 1/2-inch OD augers enabling in-situ ground water and soil samples to be collected. The boreholes for wells SL-2 and SL-3 were then reamed with 10 1/4-inch OD augers so that 4-inch wells could be installed. Wells SL-1, SL-4d and SL-5d were completed as 2-inch wells. The boreholes for SL-4s and SL-5s were advanced to the water table (approximately 120 feet below ground surface (bgs)) with the smaller augers and reamed to total depth with the large augers. Two-inch wells were installed in the upgradient well and the two deep downgradient wells to

monitor any incoming contamination and any contamination that may be leaving the site in the deep portion of the aquifer respectively. Four inch wells were installed in the remaining four wells to monitor the ground water quality and to serve as extraction wells in the future if necessary.

In-situ soil samples were collected throughout the site using both a California split spoon, advanced using a 140# jar hammer, and a CME (Central Mine Equipment) continuous sampler that was advanced with the augers. The split spoon samples were collected for lithology identification, waste characterization and physical and chemical analysis. In-situ sample locations and depths are summarized in Table 2-1. A split spoon sample collection was attempted at each depth where in-situ ground water sample was to be collected in order to characterize the aquifer material. Split spoon samples were also collected at various depths throughout the site in order to get an overall description of the subsite lithology. CME continuous samples were collected from approximately five feet below the water table (the water table is approximately 118 feet bgs) to 140 feet bgs in an attempt to verify the existence of a fine grained silt/clay layer that may act as a vertical barrier to contaminant migration.

In-situ ground water samples were collected using a Hydropunch sampler to quantify the vertical distribution of contaminants through the aquifer. After a soil sample was collected (or attempted, as it was not always possible to retrieve samples within the aquifer), the Hydropunch was placed on the bottom of the borehole and advanced using the 140# jar hammer into undisturbed material 1 to 2 feet below the bottom of the augers. The screened portion of the Hydropunch sampler was then exposed to the formation by pulling the sampling unit up 8 to 18 inches. The sample collection chamber was then allowed to fill for 15 to 30 minutes depending on the sample depth (the deeper the sampling depth the less time the sampling unit takes to fill). Once the sampling unit was full, it was retrieved from the augers and Volatile Organic Analyte (VOA) samples were collected. One nonpreserved ground water sample was collected and analyzed using a field gas chromatograph (GC), located in the warehouse in Hastings, and the other preserved ground water sample was collected and shipped to EPA laboratory in Kansas City, Kansas for analysis. The field GC was used to screen the samples for TCE, TCA, PCE and CCl<sub>4</sub>. The field GC results were used to verify the placement of the monitoring well screens. The ground water samples sent to the EPA lab were analyzed for the entire VOA suite to provide more complete analyte coverage. Table 2-2 presents a summary of contaminant detections from the in-situ ground water sampling from both the field GC and those that were sent to the EPA laboratory. Attachment A contains all of the analytical results reported by the EPA laboratory for the ground water samples. Of the compounds analyzed for by both the field

GC and the EPA laboratory, only TCE was detected by both. There were detections recorded for TCA (0.742 to 3.001 ug/l), CCl<sub>4</sub> (0.038 and 0.043 ug/l) and PCE (0.003 to 4.489 ug/l) using the field GC which are all below the detection limit reported by the EPA laboratory of 10 ug/l. The field GC values were 31 to 86% of EPA reported values of TCE. Only one exception was found, this was at the 121 foot depth of SL-3 in which the field GC reported value was 13.648 ug/l and the EPA reported value was 110 ug/l. The objective of using the field GC to screen the ground water for these compounds was successfully met.

### **2.3 Well Completion Depths and Construction Data**

The five shallow wells were installed with the screened intervals extending from 115 to 135 feet bgs. In-situ ground water samples indicated the ground water contamination was limited to the portion of the aquifer above the fine grained layer in the 120 and 140 feet bgs depth. Contaminants were not detected by the field GC in the 160 and 180 foot deep samples. These results were verified by the in-situ samples analyzed by the EPA laboratory. The two deep wells were screened from 159 to 179 feet bgs in the deep portion of the aquifer to monitor for potential future downward contaminant migration. Table 2-3 summarizes the well completion data for the wells drilled during this field investigation. The well completion diagrams and the lithologic logs are contained in Attachment B.

### **2.4 Well Development Technique**

The 2-inch wells were developed initially using a bailer to remove any sediments and to serve as a surge block. A 2-inch Grundfos pump was then lowered into the well and pumped at various depths until the water being removed was clear and the parameters (pH, temperature and electric conductivity) had stabilized. The 4-inch wells were developed using a surge block and then a 3-inch submersible pump until the above criteria were met. The minimum amount of water extracted from each well was equal to the amount of potable water added to the borehole during drilling.

### **2.5 Disposal of Investigation-Derived Wastes**

Classification and disposal of investigation-derived waste was accomplished following Nebraska Department of Environmental Quality (NDEQ) Standard Operating Procedures. The NDEQ flow chart and guidelines adhered to for waste disposal are presented as Attachment C and the screening results are in Attachment D. The waste was classified as ordinary and disposed at the Adams County landfill using a local disposal company for transport.

## **2.6 Well Survey**

The wells surrounding the South Landfill have been surveyed for location and elevation using the State Plane Coordinate System (Table 2-4). Elevations were established from a surveyed bench mark to 0.01 feet by a licensed Nebraska surveyor under subcontract to MK. This survey data will enable accurate mapping of South Landfill wells both independently and within the context of surrounding subsites.

## **2.7 Monitoring Well Ground Water Samples**

Four weeks after the last monitoring well was developed, ground water samples were collected for the first of three consecutive quarters. The quarterly data will be used to determine if seasonal variations in contaminant concentrations exist. Quarterly variations in contaminant concentrations have been observed at other Hastings sites.

Once the nature of the contamination has been determined, subsequent quarters of sampling will focus on monitoring the contaminant classes found. Domestic, industrial, and operational irrigation wells adjacent to the landfill will also be sampled over the three consecutive quarters that the monitoring wells are sampled.

## **2.8 Water Level Collection**

During the second and third quarters of sampling, water levels at subsite monitoring wells, surrounding monitoring wells, and irrigation wells will be measured. This was not performed during the first quarter of sampling because area wide water level measurements had been measured in early June.

Potentiometric maps will be generated with the survey data and water levels to refine the ground water flow direction across the landfill and presence of vertical gradients along the eastern property boundary. These maps will be compared to the observed pattern of ground water contamination to assess the consistency between contaminant distribution and ground water flow direction.

If irrigation wells are pumping, attempts will be made to measure the pumping water levels, approximate pumping rates, and ask the owners as to when the pumping began. Knowledge of the time since pumping started combined with water level measurements and estimate of deviations of the potentiometric contours from the unstressed ground water flow may be used to estimate aquifer transmissivity.



### 3.0 REFERENCES

EPA, March 1987. Data Quality Objectives for Remedial Response Activities, Volumes 1 and 2, EPA 540/G-87/003A.

MK, April 1995. Remedial Investigation/Feasibility Study Field Investigation, Part 1 Work Plan for the South Landfill Operable Unit Number 5.

MK, September 1994. South Landfill Soil Gas Investigation Report February 1994 and April 1994.

TABLE 2-1 Summary of Sample Depths (Soil and Ground Water)

Well ID	In-Situ Ground Water Sample Depth (Hydropunch)	In-Situ Soil Sample Depth (Split Spoon)	In-Situ Soil Sample Depth (CME)
SL-1	127.24 - 128.14	53.93 - 55.43	125.52 - 128.17
	145.18 - 146.08	124.88- 126.05	128.57 - 133.47
	160.02 - 160.92	143.51 - 144.68 NR	133.34 - 138.34
	179.1 - 180.0	158.26 - 159.36	
		178.67 - 179.24 NR	
SL-2	127.47 - 128.37	19.24 - 20.74	125.32 - 128.61
	136.27 - 137.17	125.05 - 126.55	129.03 - 133.59
		133.5 - 135.57	
		138.81 - 139.81	
SL-3	120.6 - 121.3	119 - 120	120 - 124 NR
	139.5 - 140.1	138.5 - 139.5	124 - 129
			129 - 134
			134 - 139
SL-4d	127 - 128	65 - 66.5	128 - 130
	142 - 143	95 - 96.5	130 - 135
	160.5 - 161.5	105 - 106.5	135 - 138.5
	181.3 - 182	124.5 - 126.5	
		138.5 - 140.5	
		159.5 - 160.5 NR	
		179 - 180.5 NR	
SL-5s		29.5 - 31	
		105 - 106	
SL-5d	121.6 - 122.5	74 - 75	120 - 124.5
	141.6 - 142.5	120 - 121	124.5 - 129.5
	161.6 - 162.6	139.5 - 141	129.5 - 134.5 NR
	181 - 182	159.5 - 160.5 NR	
		178.75 - 179.25	

NR - No sample recovered at these depth intervals.

Table 2-2 In-Situ Sample Results - Field GC\* and EPA Laboratory Results

Well ID	Sample Depth (feet bgs)/ (Sample Date)	TCA (ug/l)		CT (ug/l)		TCE (ug/l)		PCE (ug/l)	
		Field GC	EPA lab	Field GC	EPA lab	Field GC	EPA lab	Field GC	EPA lab
SL-1	128 (5/10/95)	10 K	10 K	10 K	10 K	1.54	10 K	10 K	10 K
	145 (5/11/95)	10 K	10 K	10 K	10 K	10 K	10 K	10 K	10 K
	160 (5/11/95)	10 K	10 K	10 K	10 K	10 K	10 K	10 K	10 K
	180 (5/11/95)	10 K	10 K	10 K	10 K	10 K	10 K	10 K	10 K
SL-2	128 (5/14/95)	1.64	10 K	10 K	10 K	12.4	40	3.457	10 K
	137 (5/14/95)	1.264	10 K	10 K	10 K	37.943	72	3.142	10 K
SL-3	121 (6/15/95)	10 K	10 K	.043	10 K	13.648	110	.003	10 K
	140 (6/15/95)	10 K	10 K	.038	10 K	13.816	34	.776	10 K
SL-4d	127 (6/1/95)	3.001	10 K	10 K	10 K	5.478	13	4.489	10 K
	140 (6/1/95)	0.742	10 K	10 K	10 K	23.927	46	3.791	10 K
	160 (6/1/95)	10 K	10 K	10 K	10 K	10 K	10 K	10 K	10 K
	181 (6/1/95)	10 K	10 K	10 K	10 K	0.582	10 K	10 K	10 K
SL-5d	122 (5/19/95)	1.417	10 K	10 K	10 K	21.272	65	1.258	10 K
	142 (5/19/95)	10 K	10 K	10 K	10 K	16.466	19	0.094	10 K
	162 (5/20/95)	10 K	10 K	10 K	10 K	10 K	10 K	10 K	10 K
	182 (5/20/95)	10 K	10 K	10 K	10 K	10 K	10 K	10 K	10 K

\* Field GC samples were analyzed using the Head Space method.

K Actual value of sample is < value reported.

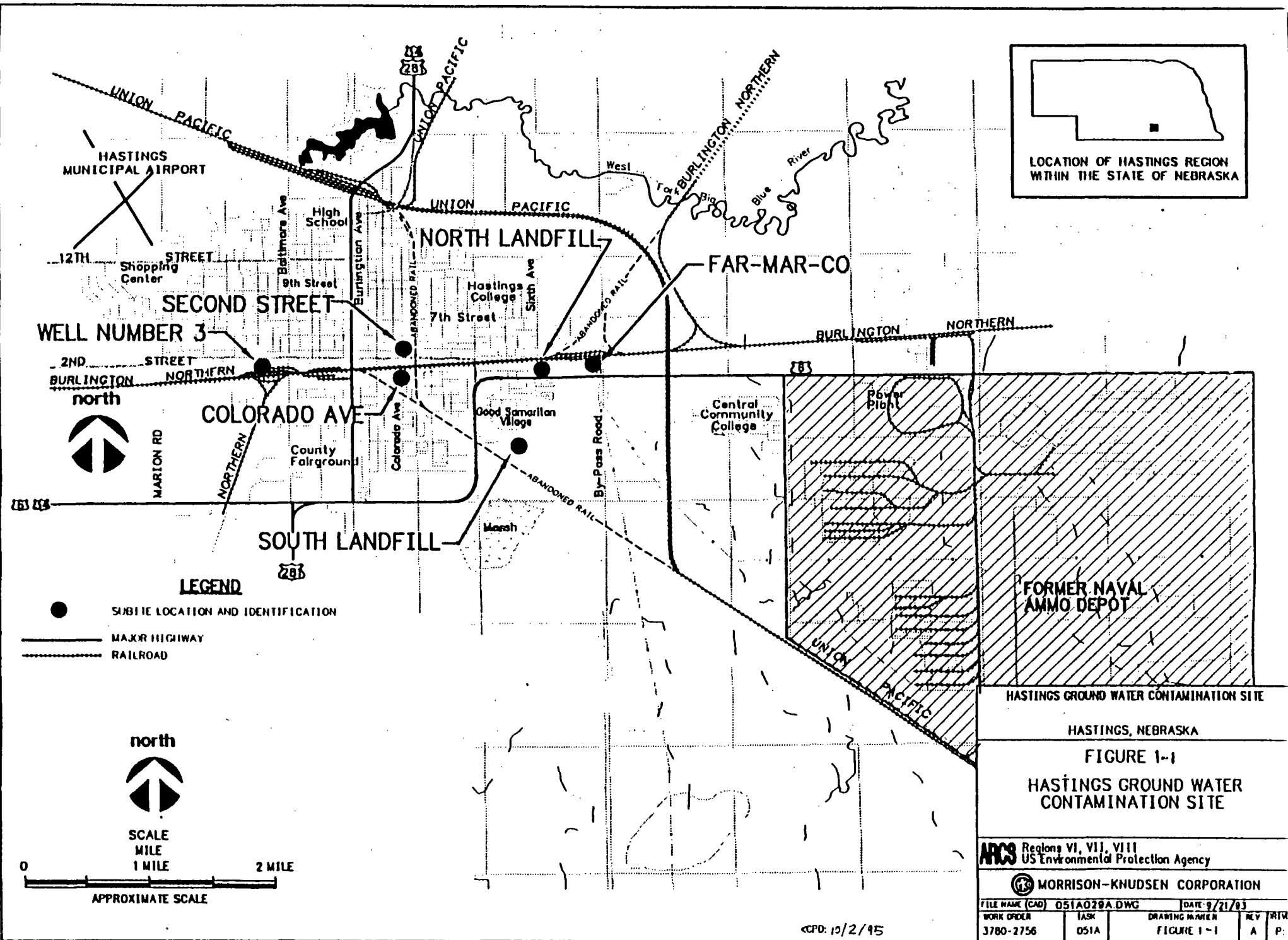
TABLE 2-3 Well Completion Data

Well ID	Borehole Depth (feet bgs)	Well Depth (feet bgs)	Sump Interval (feet bgs)	Screened Interval (feet bgs)	Well Diameter (inches)/ material	Screen Slot Size (inches)/ material
SL-1	180	138	NA	119.1-138	2/pvc	0.02/pvc
SL-2	137.5	132.2	132.2-137.2	112.7-132.2	4/pvc	0.01/stainless steel
SL-3	142	140	135-140	115-135	4/pvc	0.01/stainless steel
SL-4s	140	138	133-138	113-133	4/pvc	0.01/stainless steel
SL-4d	180	179	NA	159-179	2/pvc	0.02/pvc
SL-5s	140	140	135-140	115-135	4/pvc	0.01/stainless steel
SL-5d	180	179	NA	159-179	2/pvc	0.02/pvc

NA Not Applicable - no sumps were installed in the deep 2-inch wells because they will not be used for production wells.

TABLE 2-4 Survey Data

Well ID	Top of Casing Elevation	Ground Surface Elevation	Northing	Easting
SL-1	1917.42	1915.4	274455.998	2092161.177
SL-2	1914.15	1911.8	273928.169	2094218.170
SL-3	1913.97	1911.6	274392.318	2094113.770
SL-4s	1915.63	1913.3	273778.020	2094684.080
SL-4d	1916.10	1913.3	273785.993	2094684.000
SL-5s	1915.92	1913.1	274339.965	2094671.170
SL-5d	1916.11	1913.1	274351.044	2094671.500



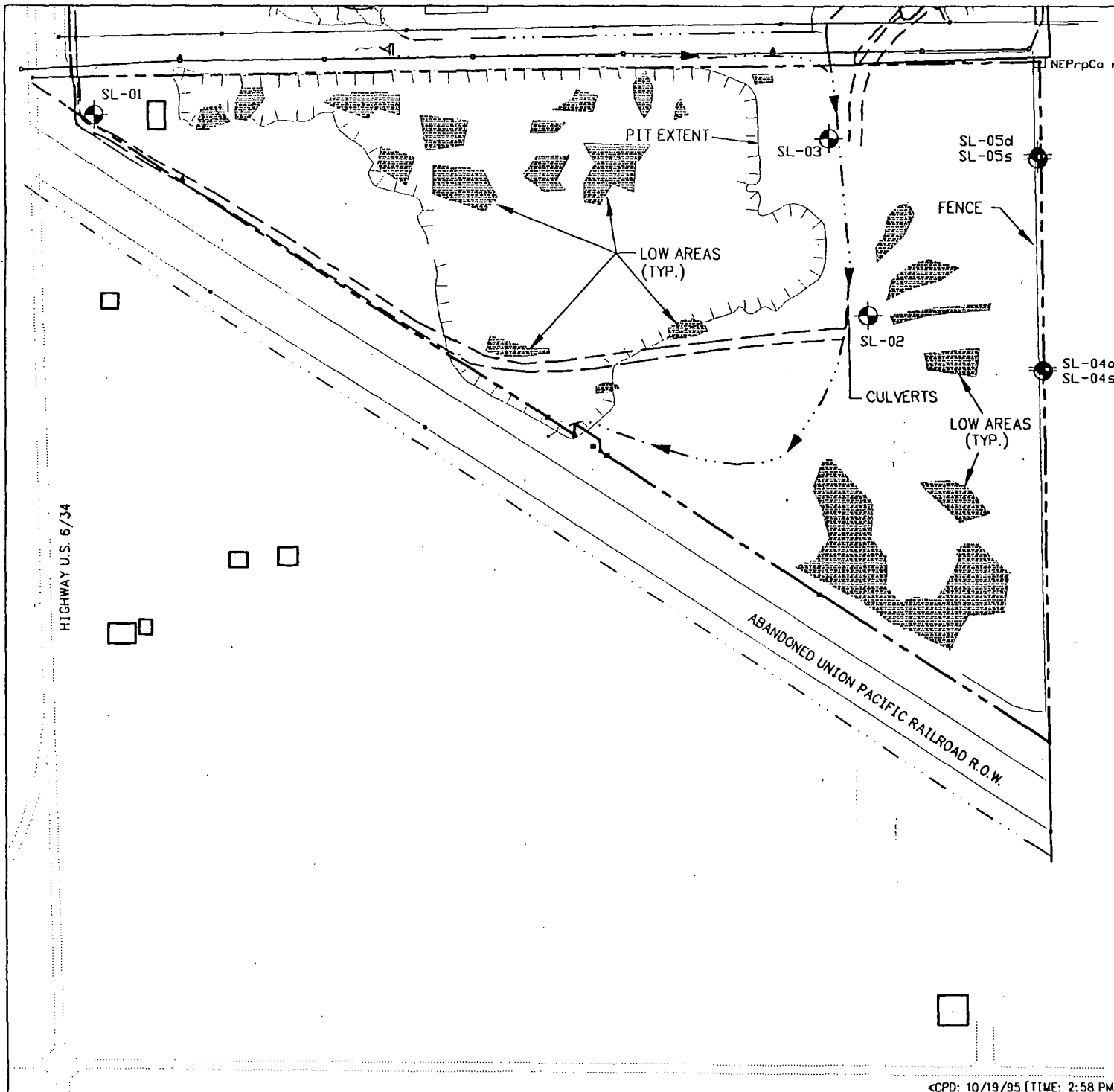
HASTINGS GROUND WATER CONTAMINATION SITE  
HASTINGS, NEBRASKA  
FIGURE 1-1  
HASTINGS GROUND WATER CONTAMINATION SITE

ARCS Regions VI, VII, VIII  
US Environmental Protection Agency

MORRISON-KNUDSEN CORPORATION

FILE NAME (CAD)	051A029A.DWG	DATE	9/21/93
WORK ORDER	3780-2756	TASK	051A
DRAWING NUMBER	FIGURE 1-1		REV
		A	P.

CPD: 10/2/95



**LEGEND**

- SOUTH LANDFILL BOUNDARY
  - - - - - EXTENT OF CLAY PIT, BASED ON 1951 PHOTO
  - == ROAD
  - ▲- INTERMITTANT STREAM WITH FLOW DIRECTION ARROW
  - ▨ LOW AREAS, PONDED IN 1951 PHOTO
  - BUILDING
  - FENCE - CORRESPONDS TO LANDFILL EXTENT
- | SYMBOL | DESCRIPTION               |
|--------|---------------------------|
| ●      | SURVEYIED MONITORING WELL |

**SURVEY NOTE:**

PROPERTY BOUNDARIES, MONITORING WELLS, RAILROAD R.O.W., SEWER, ACCESS ROAD, DITCHES, ARE ALL SURVEYED BY DAVIS SURVEYING AS REVISED ON 6/13/95.



HASTINGS GROUND WATER CONTAMINATION SITE  
SOUTH LANDFILL SUBSITE  
HASTINGS, NEBRASKA

**FIGURE 2-1**  
**MONITORING WELL LOCATIONS**

ARCS Regions VI, VII, VIII US Environmental Protection Agency				
MORRISON-KNUDSEN CORPORATION				
FILE NAME (CAD)	052M002A.DWG	DATE	10/11/95	
WORK ORDER	TASK	DRAWING NUMBER	REV.	DRIV
3780-2768	052M	FIGURE 2-1	A	P:

HIGHWAY U.S. 6/34

NEPrpCo r

ABANDONED UNION PACIFIC RAILROAD R.O.W.

# ATTACHMENT A



ANALYSIS REQUEST REPORT

VALIDATED DATA

FOR ACTIVITY: CS6MG

MORBY, ROBERT SPFD

07/20/95 17:11:01

ALL REAL SAMPLES AND FIELD Q.C.

\* FINAL REPORT

FY: 95 ACTIVITY: CS6MG DESCRIPTION: HASTINGS-SOUTH LANDFILL LOCATION: HASTINGS NEBRASKA  
 STATUS: ACTIVE TYPE: SAMPLING - IN HOUSE ANALYSIS PROJECT: L33  
 LABO DUE DATE IS 7/19/95. REPORT DUE DATE IS 8/14/95.  
 INSPECTION DATE: 6/15/95 ALL SAMPLES RECEIVED DATE: 06/19/95  
 ALL DATA APPROVED BY LABO DATE: 07/20/95 FINAL REPORT TRANSMITTED DATE: 07/20/95  
 EXPECTED LABO TURNAROUND TIME IS 30 DAYS EXPECTED REPORT TURNAROUND TIME IS 60 DAYS  
 ACTUAL LABO TURNAROUND TIME IS 31 DAYS ACTUAL REPORT TURNAROUND TIME IS 35 DAYS  
 SITE CODE: MG SITE: SOUTH LANDFILL

INSITU DATA

SAMP. NO.	QCC	M	DESCRIPTION	SAMPLE # STATUS	CITY	STATE	AIRS/ STORET LOC NO	LAY- SECT ER	BEG. DATE	BEG. TIME	END. DATE	END. TIME
001		W	SL2-128	1	HASTINGS	NEBRASKA			05/14/95	14:50	00/00/00	00:00
001	D	W	SL2-128/DUPLICATE OF 001	1	HASTINGS	NEBRASKA			05/14/95	17:15	00/00/00	00:00
002		W	SL1-127	1	HASTINGS	NEBRASKA			05/10/95	19:20	00/00/00	00:00
003		W	SL1-145	1	HASTINGS	NEBRASKA			05/11/95	10:50	00/00/00	00:00
004		W	SL1-160	1	HASTINGS	NEBRASKA			05/11/95	13:50	00/00/00	00:00
005		W	SL1-180	1	HASTINGS	NEBRASKA			05/11/95	15:50	00/00/00	00:00
006		W	SL2-137	1	HASTINGS	NEBRASKA			05/14/95	17:15	00/00/00	00:00
007		W	SL-5D	1	HASTINGS	NEBRASKA			05/19/95	15:15	00/00/00	00:00
008		W	SL-5D	1	HASTINGS	NEBRASKA			05/20/95	10:30	00/00/00	00:00
009		W	SL-5D	1	HASTINGS	NEBRASKA			05/20/95	12:25	00/00/00	00:00
010		W	SL-4D-127	1	HASTINGS	NEBRASKA			06/01/95	10:06	00/00/00	00:00
011		W	SL-4D-140	1	HASTINGS	NEBRASKA			06/01/95	13:35	00/00/00	00:00
012		W	SL-4D-160	1	HASTINGS	NEBRASKA			06/01/95	16:00	00/00/00	00:00
013		W	SL-4D-181	1	HASTINGS	NEBRASKA			06/01/95	17:50	00/00/00	00:00
014		W	SL-3-121	1	HASTINGS	NEBRASKA			06/15/95	15:30	00/00/00	00:00
016		W	SL-3-140	1	HASTINGS	NEBRASKA			06/15/95	18:17	00/00/00	00:00
018		W	SL-5D	1	HASTINGS	NEBRASKA			05/19/95	19:40	00/00/00	00:00
018	D	W	SL-5D/DUPLICATE OF 018	1	HASTINGS	NEBRASKA			05/19/95	19:40	00/00/00	00:00
019	F	W	TRIP BLANK	1	HASTINGS	NEBRASKA			05/08/95	00:00	00/00/00	00:00
020		W	SL-4D-140-R	1	HASTINGS	NEBRASKA			06/01/95	13:55	00/00/00	00:00
021	F	W	TRIP BLANK	1	HASTINGS	NEBRASKA			05/31/95	07:00	00/00/00	00:00
023	F	W	TRIP BLANK	1	HASTINGS	NEBRASKA			05/08/95	00:00	00/00/00	00:00
024	F	W	TRIP BLANK	1	HASTINGS	NEBRASKA			05/08/95	00:00	00/00/00	00:00

## VALIDATED DATA

SAMP. NO.	QCC	M	DESCRIPTION	SAMPLE STATUS	#	CITY	STATE	AIRS/ STORET LOC NO	LAY- SECT	ER	BEG. DATE	BEG. TIME	END. DATE	END. TIME
025	F	W	TRIP BLANK		1	HASTINGS	NEBRASKA				06/15/95	08:20	00/00/00	00:00

EXPLANATION OF CODES AND INFORMATION ON ANALYSIS REQUEST DETAIL REPORT

SAMPLE INFORMATION:

SAMP. NO. = SAMPLE IDENTIFICATION NUMBER (A 3-DIGIT NUMBER WHICH IN COMBINATION WITH THE ACTIVITY NUMBER AND QCC, PROVIDES AN UNIQUE NUMBER FOR EACH SAMPLE FOR IDENTIFICATION PURPOSES)

QCC = QUALITY CONTROL CODE (A ONE-LETTER CODE USED TO DESIGNATE SPECIFIC QC SAMPLES. THIS FIELD WILL BE BLANK FOR ALL NON-QC OR ACTUAL SAMPLES):

B = CAL INCREASED CONCENTRATION FOR A LAB SPIKED DUP SAMPLE  
D = MEASURED VALUE FOR FIELD DUPLICATE SAMPLE  
F = MEASURED VALUE FOR FIELD BLANK  
G = MEASURED VALUE FOR METHOD STANDARD  
H = TRUE VALUE FOR METHOD STANDARD  
K = CAL INCREASED CONCENTRATION FOR FIELD SPIKED DUP SAMPLE  
L = MEASURED VALUE FOR A LAB DUPLICATE SAMPLE  
M = MEASURED VALUE FOR LAB BLANK  
N = MEASURED CONCENTRATION OF FIELD SPIKED DUPLICATE  
P = MEASURED VALUE FOR PERFORMANCE STANDARD  
R = CAL INCREASED CONCENTRATION RESULTING FROM LAB SPIKE  
S = MEASURED CONCENTRATION OF LAB SPIKED SAMPLE  
T = TRUE VALUE OF PERFORMANCE STANDARD  
W = MEASURED CONCENTRATION OF LAB SPIKED DUPLICATE  
Y = MEASURED CONCENTRATION OF FIELD SPIKED SAMPLE  
Z = CAL INCREASED CONCENTRATION RESULTING FROM FIELD SPIKE  
1 = MEASURED VALUE OF FIRST SPIKED REPLICATE  
2 = MEASURED VALUE OF SECOND SPIKED REPLICATE  
3 = MEASURED VALUE OF THIRD SPIKED REPLICATE  
4 = MEASURED VALUE OF FOURTH SPIKED REPLICATE  
5 = MEASURED VALUE OF FIFTH SPIKED REPLICATE  
6 = MEASURED VALUE OF SIXTH SPIKED REPLICATE  
7 = MEASURED VALUE OF SEVENTH SPIKED REPLICATE

M = MEDIA CODE (A ONE-LETTER CODE DESIGNATING THE MEDIA OF THE SAMPLE):

A = AIR H = HAZARDOUS WASTE/OTHER  
S = SOLID (SOIL, SEDIMENT, SLUDGE)  
T = TISSUE (PLANT & ANIMAL)  
W = WATER (GROUND WATER, SURFACE WATER, WASTE WATER, DRINKING WATER)

DESCRIPTION = A SHORT DESCRIPTION OF THE LOCATION WHERE SAMPLE WAS COLLECTED

AIRS/STORET LOC. NO. = THE SPECIFIC LOCATION ID NUMBER OF EITHER OF THESE NATIONAL DATABASE SYSTEMS, AS APPROPRIATE

DATE/TIME INFORMATION = SPECIFIC INFORMATION REGARDING WHEN THE SAMPLE WAS COLLECTED

BEG. DATE = DATE SAMPLING WAS STARTED  
BEG. TIME = TIME SAMPLING WAS STARTED  
END DATE = DATE SAMPLING WAS COMPLETED  
END TIME = TIME SAMPLING WAS COMPLETED

NOTE: A GRAB SAMPLE WILL CONTAIN ONLY BEG. DATE/TIME  
A TIMED COMPOSITE SAMPLE WILL CONTAIN BOTH BEG AND END DATE/TIME TO DESIGNATE DURATION OF SAMPLE COLLECTION

OTHER CODES

V = VALIDATED

ANALYTICAL RESULTS/MEASUREMENTS INFORMATION:

COMPOUND = MGP (MEDIA-GROUP-PARAMETER) CODE AND NAME OF THE MEASURED CONSTITUENT OR CHARACTERISTIC OF EACH SAMPLE

UNITS = SPECIFIC UNITS IN WHICH RESULTS ARE REPORTED:

C = CENTIGRADE (CELSIUS) DEGREES  
CFS = CUBIC FEET PER SECOND  
GPM = GALLONS PER MINUTE  
IN = INCHES  
I.D. = SPECIES IDENTIFICATION  
KG = KILOGRAM  
L = LITER  
LB = POUNDS  
MG = MILLIGRAMS (1 X 10<sup>-3</sup> GRAMS)  
MGD = MILLION GALLONS PER DAY  
MPH = MILES PER HOUR  
MV = MILLIVOLT  
M/F = MALE/FEMALE  
M2 = SQUARE METER  
M3 = CUBIC METER  
NA = NOT APPLICABLE  
NG = NANOGRAMS (1 X 10<sup>-9</sup> GRAMS)  
NTU = NEPHELOMETRIC TURBIDITY UNITS  
PC/L = PICO (1 X 10<sup>-12</sup>) CURRIES PER LITER  
PG = PICOGRAMS (1 X 10<sup>-12</sup> GRAMS)  
P/CM2 = PICOGRAMS PER SQUARE CENTIMETER  
SCM = STANDARD CUBIC METER (1 ATM, 25 C)  
SQ FT = SQUARE FEET  
SU = STANDARD UNITS (PH)  
UG = MICROGRAMS (1 X 10<sup>-6</sup> GRAMS)  
UMHOS = MICROMHOS/CM (CONDUCTIVITY UNITS)  
U/CC2 = MICROGRAMS PER 100 SQUARE CENTIMETERS  
U/CM2 = MICROGRAMS PER SQUARE CENTIMETER  
1000G = 1000 GALLONS  
+/- = POSITIVE/NEGATIVE  
# = NUMBER

DATA QUALIFIERS = SPECIFIC CODES USED IN CONJUNCTION WITH DATA VALUES TO PROVIDE ADDITIONAL INFORMATION ON THE REPORTED RESULTS, OR USED TO EXPLAIN THE ABSENCE OF A SPECIFIC VALUE:

BLANK = IF FIELD IS BLANK, NO REMARKS OR QUALIFIERS ARE PERTINENT. FOR FINAL REPORTED DATA, THIS MEANS THAT THE VALUES HAVE BEEN REVIEWED AND FOUND TO BE ACCEPTABLE FOR USE.

I = INVALID SAMPLE/DATA - VALUE NOT REPORTED  
J = DATA REPORTED BUT NOT VALID BY APPROVED QC PROCEDURES  
K = ACTUAL VALUE OF SAMPLE IS < VALUE REPORTED  
L = ACTUAL VALUE OF SAMPLE IS > VALUE REPORTED  
M = DETECTED BUT BELOW THE LEVEL OF REPORTED VALUE FOR ACCURATE QUANTIFICATION  
O = PARAMETER NOT ANALYZED  
U = ACTUAL VALUE OF SAMPLE IS < THE MEASUREMENT DETECTION LIMIT (REPORTED VALUE)

## ANALYSIS REQUEST DETAIL REPORT

ACTIVITY: 5-CS6MG

VALIDATED DATA

COMPOUND	UNITS	001	001 D	002	003	004
WV03 CHLOROMETHANE, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV04 BROMOMETHANE, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV05 VINYL CHLORIDE, BY GC/MS	:UG/L	:12	:12	:10	K :10	K :10
WV06 CHLOROETHANE, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV07 METHYLENE CHLORIDE (DICHLOROMETHANE)	:UG/L	:10	K :10	K :10	K :10	K :10
WV08 DICHLOROETHYLENE, 1,1-	:UG/L	:13	:17	:10	K :10	K :10
WV09 DICHLOROETHANE, 1,1, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV10 DICHLOROETHYLENE, 1,2, TOTAL	:UG/L	:47	:52	:10	K :10	K :10
WV11 CHLOROFORM, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV12 DICHLOROETHANE, 1,2, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV13 TRICHLOROETHANE, 1,1,1-, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV14 CARBON TETRACHLORIDE, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV15 BROMODICHLOROMETHANE, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV16 DICHLOROPROPANE, 1,2, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV17 BENZENE, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV19 TRICHLOROETHYLENE	:UG/L	:40	:42	:10	K :10	K :10
WV20 DICHLOROPROPYLENE, CIS-1,3, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV21 DIBROMOCHLOROMETHANE, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV22 TRICHLOROETHANE, 1,1,2-, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV24 BROMOFORM, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV25 TETRACHLOROETHYLENE	:UG/L	:10	K :10	K :10	K :10	K :10
WV26 TOLUENE, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV27 TETRACHLOROETHANE, 1,1,2,2, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV28 CHLOROBENZENE, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV29 ETHYL BENZENE, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV30 ACETONE, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10

## ANALYSIS REQUEST DETAIL REPORT

ACTIVITY: 5-CS6MG

VALIDATED DATA

COMPOUND	UNITS	001	001 D	002	003	004
WV31 CARBON DISULFIDE, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV32 METHYL ETHYL KETONE (2-BUTANONE)	:UG/L	:10	K :10	K :10	K :10	K :10
WV34 HEXANONE, 2-	:UG/L	:10	K :10	K :10	K :10	K :10
WV35 4-METHYL-2-PENTANONE(MIBK)	:UG/L	:10	K :10	K :10	K :10	K :10
WV36 STYRENE, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV37 XYLENES, TOTAL, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV40 DICHLOROPROPYLENE, TRANS-1,3	:UG/L	:10	K :10	K :10	K :10	K :10
WV78 DICHLOROETHYLENE, TRANS-1,2	:UG/L	:1	K :1	K :	:	:
WV82 DICHLOROETHYLENE, CIS-1,2	:UG/L	:42	:41	:	:	:
ZZ01 SAMPLE NUMBER	:NA	:001	:001	:002	:003	:004
ZZ02 ACTIVITY CODE	:NA	:CS6MG	:CS6MG	:CS6MG	:CS6MG	:CS6MG
ZZ04 SUBSITE, IDENTIFIER	:	:MG	:MG	:MG	:MG	:MG
ZZ05 OPERABLE UNIT	:	:05	:05	:05	:05	:05

## ANALYSIS REQUEST DETAIL REPORT

ACTIVITY: 5-CS6MG

VALIDATED DATA

COMPOUND	UNITS	005	006	007	008	009
WV03 CHLOROMETHANE, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV04 BROMOMETHANE, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV05 VINYL CHLORIDE, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV06 CHLOROETHANE, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV07 METHYLENE CHLORIDE (DICHLOROMETHANE)	:UG/L	:10	K :10	K :11	:10	K :10
WV08 DICHLOROETHYLENE, 1,1-	:UG/L	:10	K :10	K :10	K :10	K :10
WV09 DICHLOROETHANE, 1,1, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV10 DICHLOROETHYLENE, 1,2, TOTAL	:UG/L	:10	K :19	:10	K :10	K :10
WV11 CHLOROFORM, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV12 DICHLOROETHANE, 1,2, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV13 TRICHLOROETHANE, 1,1,1-, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV14 CARBON TETRACHLORIDE, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV15 BROMODICHLOROMETHANE, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV16 DICHLOROPROPANE, 1,2, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV17 BENZENE, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV19 TRICHLOROETHYLENE	:UG/L	:10	K :72	:65	:10	K :10
WV20 DICHLOROPROPYLENE, CIS-1,3, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV21 DIBROMOCHLOROMETHANE, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV22 TRICHLOROETHANE, 1,1,2-, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV24 BROMOFORM, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV25 TETRACHLOROETHYLENE	:UG/L	:10	K :10	K :10	K :10	K :10
WV26 TOLUENE, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV27 TETRACHLOROETHANE, 1,1,2,2, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV28 CHLOROBENZENE, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV29 ETHYL BENZENE, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV30 ACETONE, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10

## ANALYSIS REQUEST DETAIL REPORT

ACTIVITY: 5-CS6MG

VALIDATED DATA

COMPOUND	UNITS	005	006	007	008	009
WV31 CARBON DISULFIDE, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV32 METHYL ETHYL KETONE (2-BUTANONE)	:UG/L	:10	K :10	K :10	K :10	K :10
WV34 HEXANONE, 2-	:UG/L	:10	K :10	K :10	K :10	K :10
WV35 4-METHYL-2-PENTANONE(MIBK)	:UG/L	:10	K :10	K :10	K :10	K :10
WV36 STYRENE, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV37 XYLENES, TOTAL, BY GC/MS	:UG/L	:10	K :10	K :10	K :11	:10
WV40 DICHLOROPROPYLENE, TRANS-1,3	:UG/L	:10	K :10	K :10	K :10	K :10
WV78 DICHLOROETHYLENE, TRANS-1,2	:UG/L	:	:1	K :	:	:
WV82 DICHLOROETHYLENE, CIS-1,2	:UG/L	:	:16	:	:	:
ZZ01 SAMPLE NUMBER	:NA	:005	:006	:007	:008	:009
ZZ02 ACTIVITY CODE	:NA	:CS6MG	:CS6MG	:CS6MG	:CS6MG	:CS6MG
ZZ04 SUBSITE, IDENTIFIER	:	:MG	:MG	:MG	:MG	:MG
ZZ05 OPERABLE UNIT	:	:05	:05	:05	:05	:05

## ANALYSIS REQUEST DETAIL REPORT

ACTIVITY: 5-CS6MG

VALIDATED DATA

COMPOUND	UNITS	010	011	012	013	014
WV03 CHLOROMETHANE, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV04 BROMOMETHANE, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV05 VINYL CHLORIDE, BY GC/MS	:UG/L	:21	:10	K :10	K :10	K :10
WV06 CHLOROETHANE, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV07 METHYLENE CHLORIDE (DICHLOROMETHANE)	:UG/L	:10	K :10	K :10	K :10	K :10
WV08 DICHLOROETHYLENE, 1,1-	:UG/L	:18	:10	K :10	K :10	K :10
WV09 DICHLOROETHANE, 1,1, BY GC/MS	:UG/L	:26	:10	K :10	K :10	K :10
WV10 DICHLOROETHYLENE, 1,2, TOTAL	:UG/L	:13	:32	:10	K :10	K :20
WV11 CHLOROFORM, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV12 DICHLOROETHANE, 1,2, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV13 TRICHLOROETHANE, 1,1,1-, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV14 CARBON TETRACHLORIDE, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV15 BROMODICHLOROMETHANE, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV16 DICHLOROPROPANE, 1,2, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV17 BENZENE, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV19 TRICHLOROETHYLENE	:UG/L	:13	:46	:10	K :10	K :110
WV20 DICHLOROPROPYLENE, CIS-1,3, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV21 DIBROMOCHLOROMETHANE, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV22 TRICHLOROETHANE, 1,1,2-, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV24 BROMOFORM, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV25 TETRACHLOROETHYLENE	:UG/L	:10	K :10	K :10	K :10	K :10
WV26 TOLUENE, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV27 TETRACHLOROETHANE, 1,1,2,2, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV28 CHLOROBENZENE, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV29 ETHYL BENZENE, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV30 ACETONE, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10



## ANALYSIS REQUEST DETAIL REPORT

ACTIVITY: 5-CS6MG

VALIDATED DATA

COMPOUND	UNITS	010	011	012	013	014
WV31 CARBON DISULFIDE, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV32 METHYL ETHYL KETONE (2-BUTANONE)	:UG/L	:10	K :10	K :10	K :10	K :10
WV34 HEXANONE, 2-	:UG/L	:10	K :10	K :10	K :10	K :10
WV35 4-METHYL-2-PENTANONE(MIBK)	:UG/L	:10	K :10	K :10	K :10	K :10
WV36 STYRENE, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV37 XYLENES, TOTAL, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV40 DICHLOROPROPYLENE, TRANS-1,3	:UG/L	:10	K :10	K :10	K :10	K :10
WV78 DICHLOROETHYLENE, TRANS-1,2	:UG/L	:1	K :1	K :	:	:1
WV82 DICHLOROETHYLENE, CIS-1,2	:UG/L	:11	:27	:	:	:22
ZZ01 SAMPLE NUMBER	:NA	:010	:011	:012	:013	:014
ZZ02 ACTIVITY CODE	:NA	:CS6MG	:CS6MG	:CS6MG	:CS6MG	:CS6MG
ZZ04 SUBSITE, IDENTIFIER	:	:MG	:MG	:MG	:MG	:MG
ZZ05 OPERABLE UNIT	:	:05	:05	:05	:05	:05

## ANALYSIS REQUEST DETAIL REPORT

ACTIVITY: 5-CS6MG

VALIDATED DATA

COMPOUND	UNITS	016	018	018 D	019 F	020
WV03 CHLOROMETHANE, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV04 BROMOMETHANE, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV05 VINYL CHLORIDE, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV06 CHLOROETHANE, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV07 METHYLENE CHLORIDE (DICHLOROMETHANE)	:UG/L	:10	K :10	K :10	K :10	K :10
WV08 DICHLOROETHYLENE, 1,1-	:UG/L	:10	K :10	K :10	K :10	K :10
WV09 DICHLOROETHANE, 1,1, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV10 DICHLOROETHYLENE, 1,2, TOTAL	:UG/L	:10	K :10	K :10	K :10	K :10
WV11 CHLOROFORM, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV12 DICHLOROETHANE, 1,2, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV13 TRICHLOROETHANE, 1,1,1-, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV14 CARBON TETRACHLORIDE, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV15 BROMODICHLOROMETHANE, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV16 DICHLOROPROPANE, 1,2, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV17 BENZENE, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV19 TRICHLOROETHYLENE	:UG/L	:34	:19	:16	:10	K :10
WV20 DICHLOROPROPYLENE, CIS-1,3, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV21 DIBROMOCHLOROMETHANE, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV22 TRICHLOROETHANE, 1,1,2-, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV24 BROMOFORM, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV25 TETRACHLOROETHYLENE	:UG/L	:10	K :10	K :10	K :10	K :10
WV26 TOLUENE, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV27 TETRACHLOROETHANE, 1,1,2,2, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV28 CHLOROBENZENE, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV29 ETHYL BENZENE, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV30 ACETONE, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10

ANALYSIS REQUEST DETAIL REPORT

ACTIVITY: 5-CS6MG

VALIDATED DATA

COMPOUND	UNITS	016	018	018 D	019 F	020
WV31 CARBON DISULFIDE, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV32 METHYL ETHYL KETONE (2-BUTANONE)	:UG/L	:10	K :10	K :10	K :10	K :10
WV34 HEXANONE, 2-	:UG/L	:10	K :10	K :10	K :10	K :10
WV35 4-METHYL-2-PENTANONE(MIBK)	:UG/L	:10	K :10	K :10	K :10	K :10
WV36 STYRENE, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV37 XYLENES, TOTAL, BY GC/MS	:UG/L	:10	K :10	K :10	K :10	K :10
WV40 DICHLOROPROPYLENE,TRANS-1,3	:UG/L	:10	K :10	K :10	K :10	K :10
ZZ01 SAMPLE NUMBER	:NA	:016	:018	:018	:019	:020
ZZ02 ACTIVITY CODE	:NA	:CS6MG	:CS6MG	:CS6MG	:CS6MG	:CS6MG
ZZ04 SUBSITE, IDENTIFIER	:	:MG	:MG	:MG	:MG	:MG
ZZ05 OPERABLE UNIT	:	:05	:05	:05	:05	:05

## ANALYSIS REQUEST DETAIL REPORT

ACTIVITY: 5-CS6MG

VALIDATED DATA

COMPOUND	UNITS	021 F	023 F	024 F	025 F
WV03 CHLOROMETHANE, BY GC/MS	:UG/L	:10	K :10	K :10	K :10
WV04 BROMOMETHANE, BY GC/MS	:UG/L	:10	K :10	K :10	K :10
WV05 VINYL CHLORIDE, BY GC/MS	:UG/L	:10	K :10	K :10	K :10
WV06 CHLOROETHANE, BY GC/MS	:UG/L	:10	K :10	K :10	K :10
WV07 METHYLENE CHLORIDE (DICHLOROMETHANE)	:UG/L	:10	K :10	K :10	K :10
WV08 DICHLOROETHYLENE, 1,1-	:UG/L	:10	K :10	K :10	K :10
WV09 DICHLOROETHANE, 1,1, BY GC/MS	:UG/L	:10	K :10	K :10	K :10
WV10 DICHLOROETHYLENE, 1,2, TOTAL	:UG/L	:10	K :10	K :10	K :10
WV11 CHLOROFORM, BY GC/MS	:UG/L	:10	K :10	K :10	K :10
WV12 DICHLOROETHANE, 1,2, BY GC/MS	:UG/L	:10	K :10	K :10	K :10
WV13 TRICHLOROETHANE, 1,1,1-, BY GC/MS	:UG/L	:10	K :10	K :10	K :10
WV14 CARBON TETRACHLORIDE, BY GC/MS	:UG/L	:10	K :10	K :10	K :10
WV15 BROMODICHLOROMETHANE, BY GC/MS	:UG/L	:10	K :10	K :10	K :10
WV16 DICHLOROPROPANE, 1,2, BY GC/MS	:UG/L	:10	K :10	K :10	K :10
WV17 BENZENE, BY GC/MS	:UG/L	:10	K :10	K :10	K :10
WV19 TRICHLOROETHYLENE	:UG/L	:10	K :10	K :10	K :10
WV20 DICHLOROPROPYLENE, CIS-1,3, BY GC/MS	:UG/L	:10	K :10	K :10	K :10
WV21 DIBROMOCHLOROMETHANE, BY GC/MS	:UG/L	:10	K :10	K :10	K :10
WV22 TRICHLOROETHANE, 1,1,2-, BY GC/MS	:UG/L	:10	K :10	K :10	K :10
WV24 BROMOFORM, BY GC/MS	:UG/L	:10	K :10	K :10	K :10
WV25 TETRACHLOROETHYLENE	:UG/L	:10	K :10	K :10	K :10
WV26 TOLUENE, BY GC/MS	:UG/L	:10	K :10	K :10	K :10
WV27 TETRACHLOROETHANE, 1,1,2,2, BY GC/MS	:UG/L	:10	K :10	K :10	K :10
WV28 CHLOROBENZENE, BY GC/MS	:UG/L	:10	K :10	K :10	K :10
WV29 ETHYL BENZENE, BY GC/MS	:UG/L	:10	K :10	K :10	K :10
WV30 ACETONE, BY GC/MS	:UG/L	:10	K :10	K :10	K :10

## ANALYSIS REQUEST DETAIL REPORT

ACTIVITY: 5-CS6MG

VALIDATED DATA

COMPOUND	UNITS	021 F	023 F	024 F	025 F
WV31 CARBON DISULFIDE, BY GC/MS	:UG/L :10	K :10	K :10	K :10	K :10
WV32 METHYL ETHYL KETONE (2-BUTANONE)	:UG/L :10	K :10	K :10	K :10	K :10
WV34 HEXANONE, 2-	:UG/L :10	K :10	K :10	K :10	K :10
WV35 4-METHYL-2-PENTANONE(MIBK)	:UG/L :10	K :10	K :10	K :10	K :10
WV36 STYRENE, BY GC/MS	:UG/L :10	K :10	K :10	K :10	K :10
WV37 XYLENES, TOTAL, BY GC/MS	:UG/L :10	K :10	K :10	K :10	K :10
WV40 DICHLOROPROPYLENE, TRANS-1,3	:UG/L :10	K :10	K :10	K :10	K :10
ZZ01 SAMPLE NUMBER	:NA :021	:023	:024	:025	
ZZ02 ACTIVITY CODE	:NA :CS6MG	:CS6MG	:CS6MG	:CS6MG	
ZZ04 SUBSITE, IDENTIFIER	: :MG	:MG	:MG	:MG	
ZZ05 OPERABLE UNIT	: :05	:05	:05	:05	

ACTIVITY CS6MG

HASTINGS-SOUTH LANDFILL

THE PROJECT LEADER SHOULD CIRCLE ONE - STORET, AIRS, OR ARCHIVE.

CIRCLE ONE:

STORET

AIRS

ARCHIVE

DATA APPROVED BY LABO FOR TRANSMISSION TO PROJECT LEADER ON 07/20/95 15:30:09 BY

M. Thomas

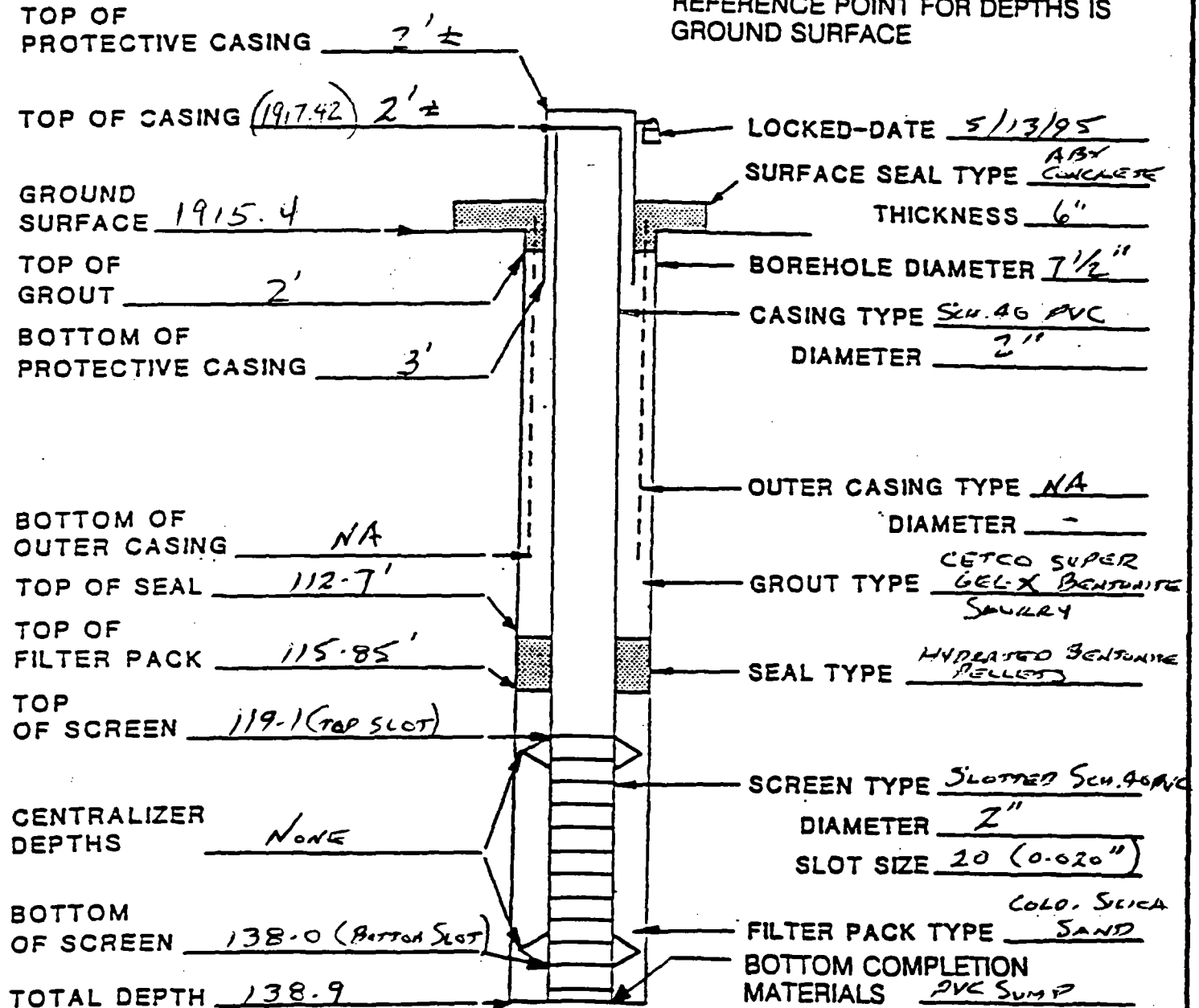
# ATTACHMENT B

# WELL COMPLETION RECORD

WELL NUMBER SL-1 DATE INSTALLED 5/12/95

REPRESENTATIVE PAUL WELLS DRILLER J & R DRILLING SERVICES

REFERENCE POINT FOR DEPTHS IS GROUND SURFACE



COMMENTS BUFFER SAND OF FINE GRAINED SAND FROM 115.85 TO 114.10 MANUFACTURED BY UNIMIN; TRADE NAME GRANISIL 4010 SAND. GRANISIL

REPRESENTATIVE SIGNATURE Paul A. Wells DATE 5/14/95

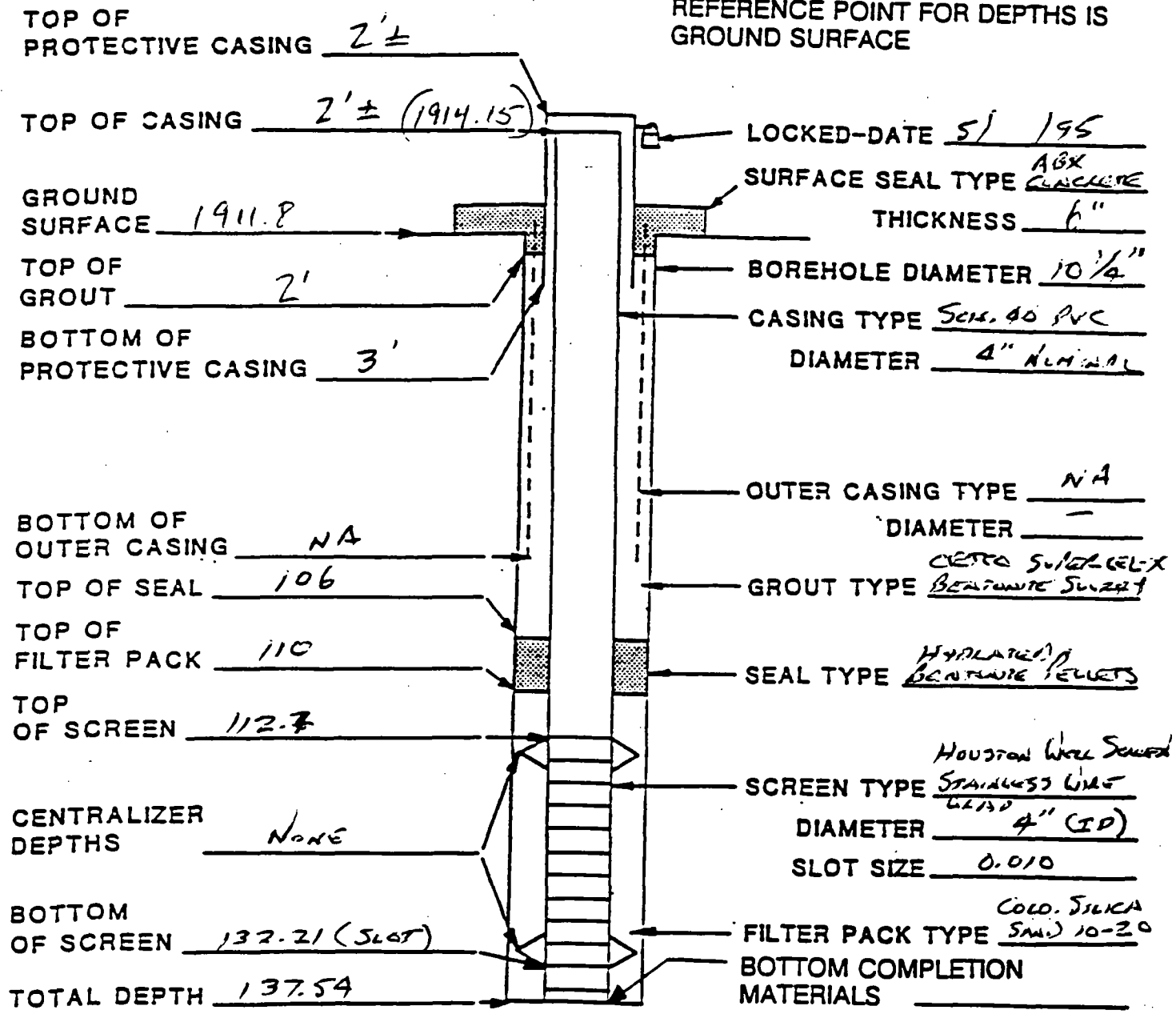


# WELL COMPLETION RECORD

WELL NUMBER SL-2 DATE INSTALLED 5/15/95

REPRESENTATIVE Paul Wells DRILLER J&K Drilling Services

REFERENCE POINT FOR DEPTHS IS GROUND SURFACE



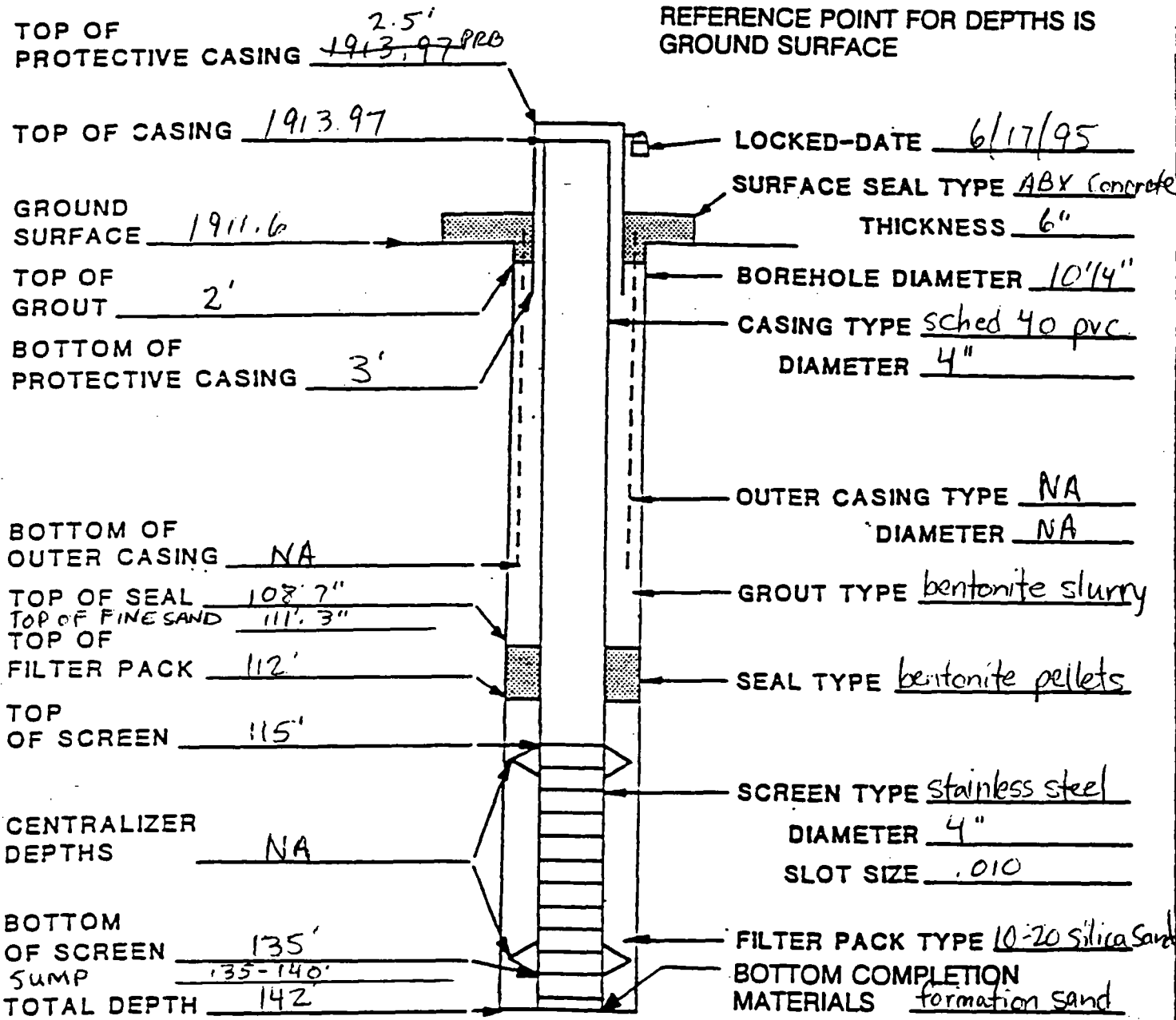
COMMENTS SUMP OF BLANK SCH. 40 PVC EXTENDS APPROXIMATELY 5 FEET BELOW SCREEN FINE GRAINED BUFFER SAND PLACED ABOVE 10-20 PACK TO 167.3

REPRESENTATIVE SIGNATURE Paul J. Wells DATE 5/16/95

# WELL COMPLETION RECORD

WELL NUMBER SL-3 DATE INSTALLED 6/16/95

REPRESENTATIVE Peter R Berglund DRILLER J+R Drilling



COMMENTS fine sand buffer installed 111.3' to 112'

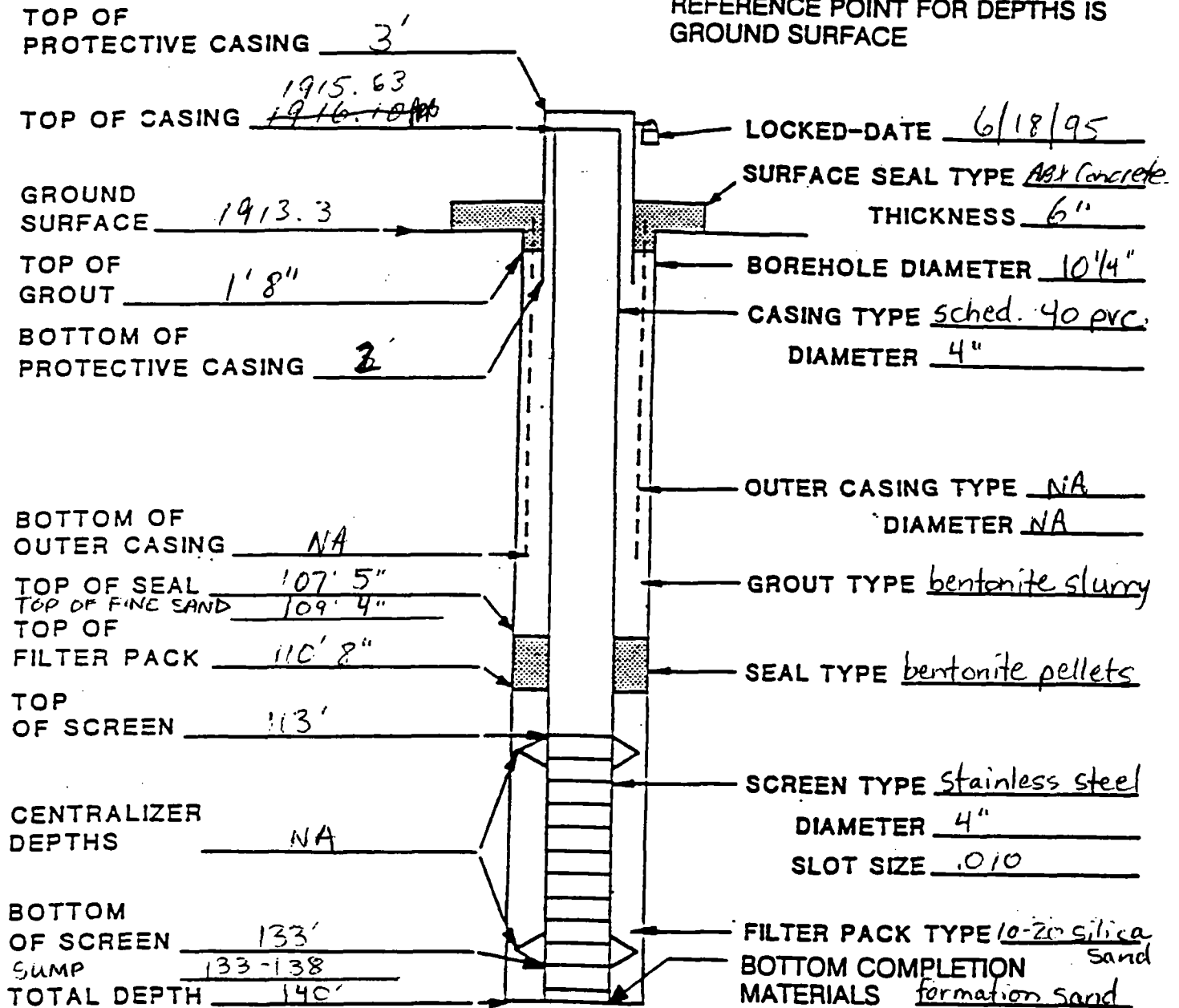
REPRESENTATIVE SIGNATURE Peter R Berglund DATE 6/28/95

WELL COMPLETION RECORD

WELL NUMBER SL-45 DATE INSTALLED 6/14/95

REPRESENTATIVE Peter R Berglund DRILLER J+R Drilling

REFERENCE POINT FOR DEPTHS IS GROUND SURFACE



COMMENTS fine grain sand buffer installed 109'4" to 110'8"

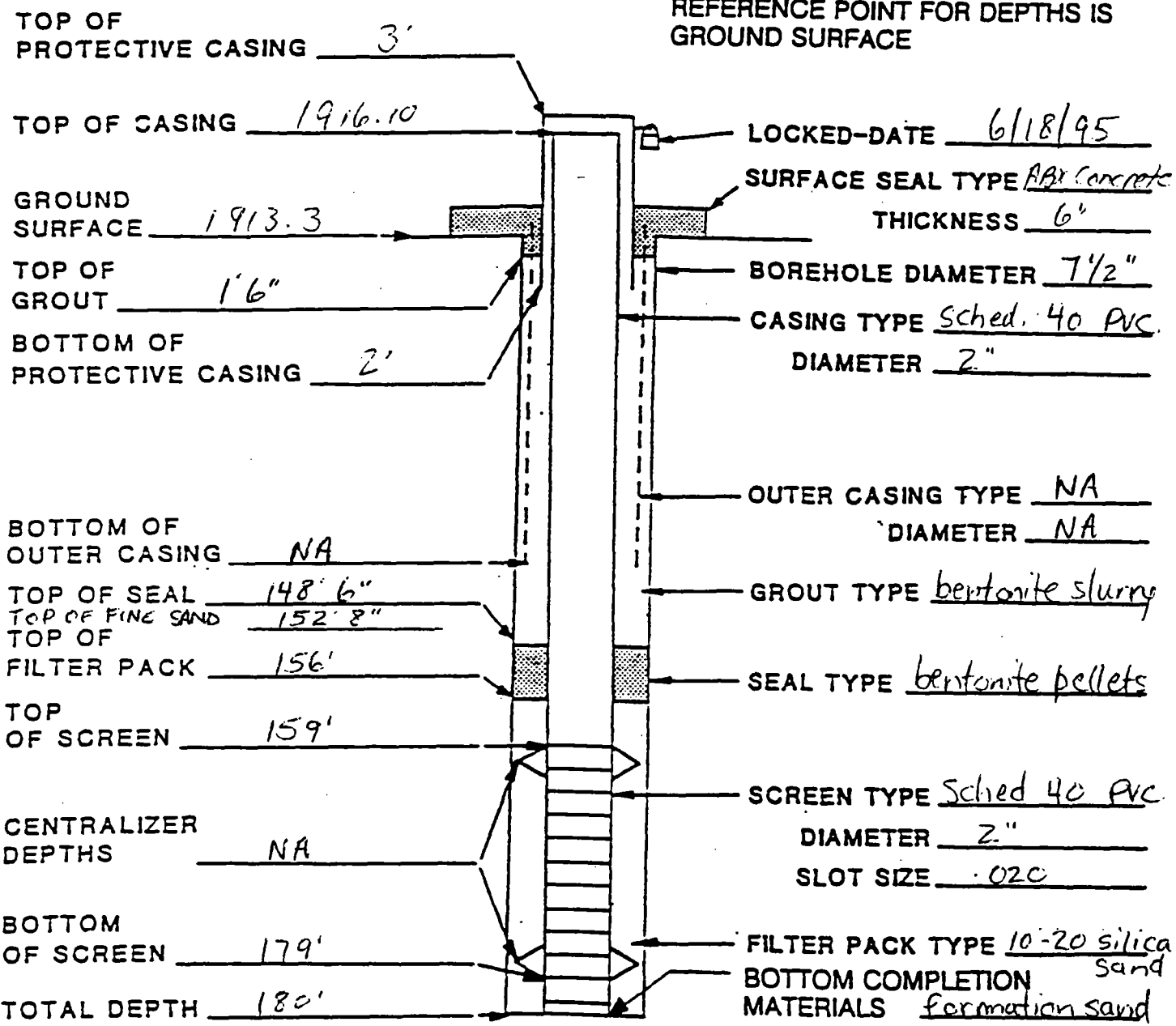
REPRESENTATIVE SIGNATURE Peter R Berglund DATE 6/28/95

**WELL COMPLETION RECORD**

WELL NUMBER SL-4d DATE INSTALLED 6/1/95

REPRESENTATIVE Peter R Berglund DRILLER J+R Drilling

REFERENCE POINT FOR DEPTHS IS GROUND SURFACE



COMMENTS fine grain sand buffer installed 152'8" to 156'

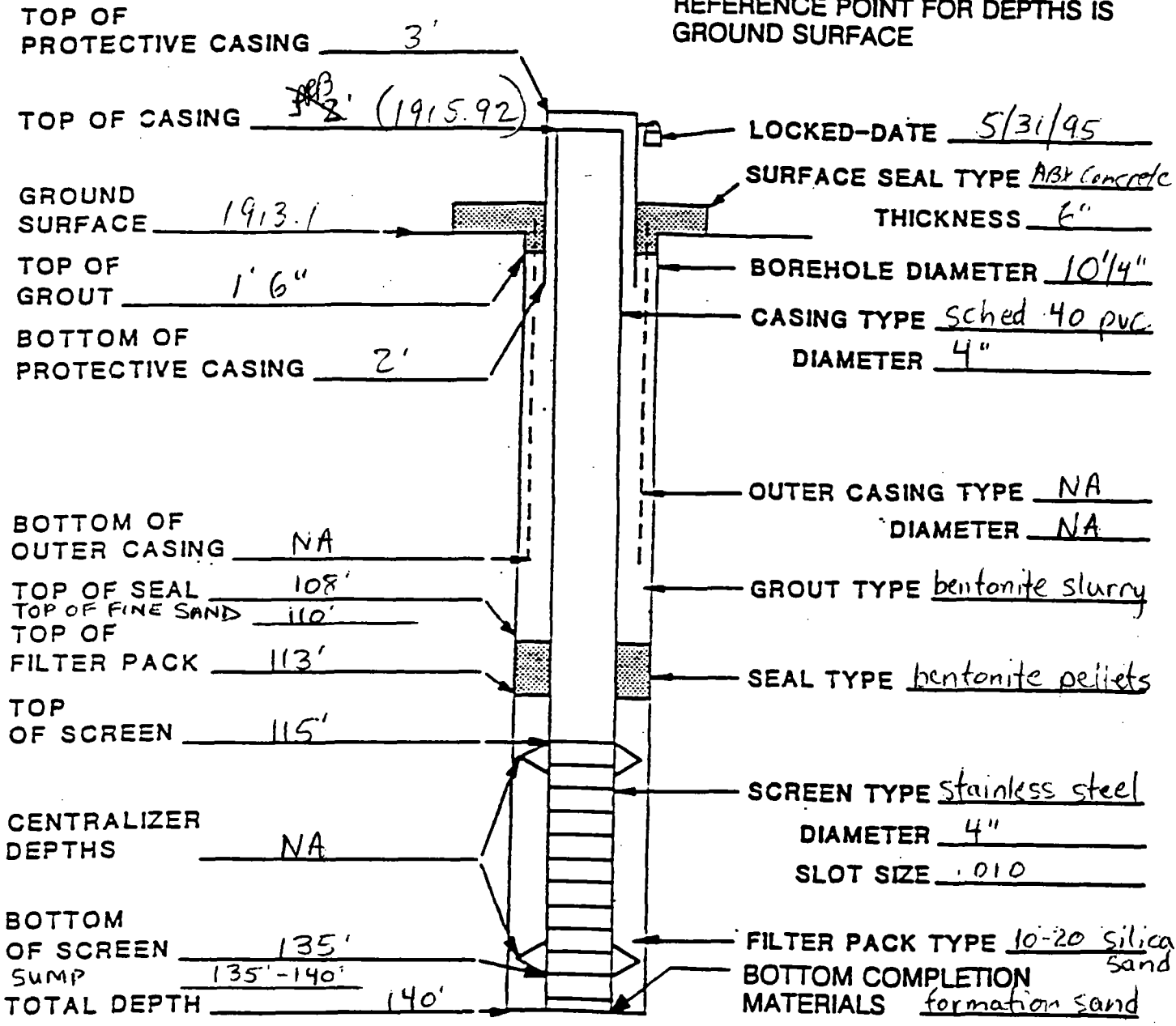
REPRESENTATIVE SIGNATURE Peter R Berglund DATE 6/28/95

WELL COMPLETION RECORD

WELL NUMBER SL-5s DATE INSTALLED 5/23/95

REPRESENTATIVE Peter R. Berglund DRILLER J+R Drilling

REFERENCE POINT FOR DEPTHS IS GROUND SURFACE



COMMENTS fine grain sand buffer installed 110' to 113'

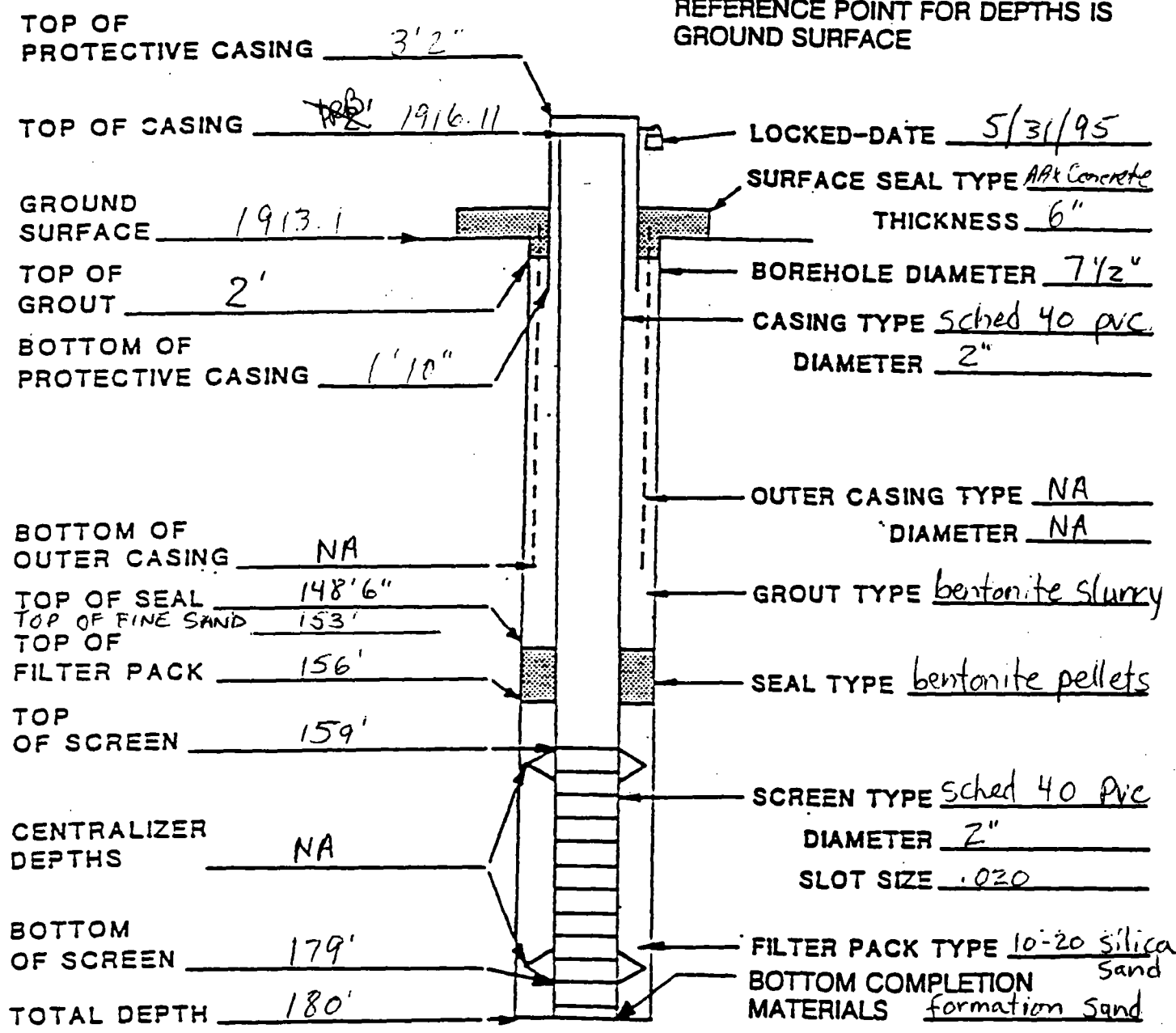
REPRESENTATIVE SIGNATURE Peter R. Berglund DATE 6/28/95

**WELL COMPLETION RECORD**

WELL NUMBER SL-5d DATE INSTALLED 5/20/95

REPRESENTATIVE Peter R Berglund DRILLER J+R Drilling

REFERENCE POINT FOR DEPTHS IS GROUND SURFACE



COMMENTS fine grain sand buffer installed 153' to 156'

REPRESENTATIVE SIGNATURE Peter R Berglund DATE 6/28/95



MORRISON KNUDSEN CORPORATION  
ENVIRONMENTAL SERVICES GROUP

**BOREHOLE LOG**

Sheet 1 of 7

Project Number:  
**3780-2756**

Hole Number:  
**5L-1**

Project: **SOUTH LANDFILL RI/FS FIELD INVEST. PART I** Location: **UP GRADIENT TO SOUTH LANDFILL**

Coordinates: **N-274455.998 E-2092161.177** Drilling Contractor: **J&R DRILLING SERVICES**

Drill Make and Model / Drilling Method: **CME 750 / HOLLOW STEM AUGER** Depth Top of Rock: **NA** Depth Casing & Size: **138.9' 2" SW. 40** Hole Size: **7 1/2"**

Elevation: **1915.4** Angle from Vert. and Bearing: **VERTICAL** Depth Bottom of Hole: **180' (HYDROPHONIC SAMPLE)**

Water Level: **116.05 BGS (5/12/95)** Fluid & Additives: **WATER** Date Start: **5/10/95** Date Finish: **5/12/95** Logger: **P. WELLS**

TIME	ELEVATION	SAMPLE			STANDARD PENETRATION TEST RESULTS	SYMBOLIC LOG	SOIL DESCRIPTION
		INTERVAL	TYPE & NUMBER	% RECOVERY	6"-8"-8" (N)		
10:00 5/10/95						CL	0-7' LEAN CLAY, (CL). DARK YELLOWISH BROWN (10YR 4/2), MEDIUM PLASTICITY, MOIST
10:20	10	10-15' SAND & GRAVEL				CL/CH	7-10' LEAN TO FAT CLAY, (CL/CH). GRAYISH BROWN (5YR 3/2), MEDIUM TO HIGH PLASTICITY. GRAIN SIZE APPEARS RESTRICTED TO SILT AND CLAY PARTICLES, MOIST, TRANSITIONAL CHANGE FROM 0-7' UNIT
10:30	20					CL	10-28' LEAN CLAY, (CL). MODERATE YELLOWISH BROWN (10YR 5/4), MEDIUM PLASTICITY, GRAIN SIZE IN SILT AND CLAY PARTICLE SIZE, TRACE SAND, MOIST TRANSITIONAL CHANGE FROM 7-10' UNIT
10:35	30	30' SAND & GRAVEL				CL/CH	28-34' LEAN TO FAT CLAY, (CL/CH). GRAYISH BROWN (5YR 3/2), MEDIUM TO HIGH PLASTICITY, MOIST
	34					CL	34-38' LEAN CLAY, (CL). DARK YELLOWISH BROWN (10YR 4/2), MEDIUM PLASTICITY, MOIST, TRANSITIONAL CHANGE WITH 28-34' UNIT
	40					CL	38-40' LEAN CLAY, (CL). MODERATE BROWN (5YR 4/4), TRACE OF SAND TO 0.1mm, MEDIUM PLASTICITY, MOIST
	48					CL	40-48' LEAN CLAY, (CL). MODERATE YELLOWISH BROWN, (10YR 5/4), 5 TO 10% SAND, 0.1mm MAXIMUM GRAIN SIZE, LOW TO MEDIUM PLASTICITY, MOIST, TRANSITION TO BELOW
11:00	50						48-52' SILTY SAND, (SM). MODERATE BROWN (5YR 4/4) CONTINUED...

CUTTINGS



**BOREHOLE LOG**

Project: SOUTH LANDFILL RI/FS FIELD INVEST. PART 1 Location: UP GRADIENT TO SOUTH LANDFILL

TIME	ELEVATION	DEPTH BELOW SURFACE (F)	SAMPLE			STANDARD PENETRATION TEST RESULTS	SYMBOLIC LOG	SOIL DESCRIPTION
			INTERVAL	TYPE & NUMBER	RECOVERY	6"-6"-6" (N)		
		50					SM	FINE SAND TO 0.5mm, QUARTZOSE, SUBROUNDED, 15-25% SILT, LOW PLASTICITY, MOIST.
1150		52-54'	3" PIT BARREL		100%	16-26-30	CL	52-54' LEAN CLAY (CL), DARK YELLOWISH BROWN (10YR 4/2), DESCRIPTION AS 40-48'
		53.9-55.4					SM	53.9-55.4 SILTY SAND (SM). MODERATE YELLOWISH BROWN (10YR 2.5/4), FINE SAND TO 0.25mm, 15-26% SILT, SAND IS POORLY GRADED, 80-85% QUARTZ, 5-10% FELDSPAR, 5% MICA/PARK MINERALS. SAMPLE IS NON-PLASTIC, MOIST. SAND IS ROUNDED TO SUBROUNDED. SAMPLE CONTAINS APPROX. 5% DARK BROWN TO BLACK OXIDIZED ORGANIC MATERIAL - MAY BE ROOTS - FRAGILE IN CROSS SECTION, AND OBSERVED ON HORIZONTAL SECTION OF CORE.
		54.4-54.9					SM-SP	PHYSICAL PROPERTY SAMPLE 54.4-54.9' SL1-SS5 TOC/METALS SAMPLE 54.9-55.4' SL1-SS-5 S-CSSM6-10
1245		55-75'					SP	55-75' SILTY SAND (SM), MODERATE YELLOWISH BROWN (10YR 5/4) TO DARK YELLOWISH BROWN (10YR 4/2), FINE TO MEDIUM SAND TO 1.0mm (CLAY), COARSENING WITH DEPTH, 15-30% SILT, SAND IS QUARTZOSE, ROUNDED TO SUBROUNDED, SAMPLES ARE MOIST, LOW PLASTICITY
1020		75-85'					SP	75-85' SILTY TO POORLY GRADED SAND (SM-SP), DARK YELLOWISH BROWN (10YR 4/2), 10-15% SILT, FINE TO MEDIUM GRAINED SAND TO 2mm PARTICLE SIZE IN 75-80' INTERVAL, 56% OF SAND MEDIUM IN 75-80' INTERVAL, 10-15% MEDIUM IN 80-85' INTERVAL, NON-PLASTIC, QUARTZOSE, SUBROUNDED TO ROUNDED, MOIST.
		85-95'					SP	85-95' POORLY GRADED SAND (SP), DARK YELLOWISH BROWN (10YR 4/2). TRACE OF SILT (<5%), SAND IS DOMINANTLY MEDIUM GRAINED (60-70% OR SAND MEDIUM), 2mm MAXIMUM SIZE, QUARTZOSE, SUBROUNDED, MOIST.
		100						
		110						

53.9-55.4 HANU & BACKGROUND

HANU & BACKGROUND

WYTTINGS





MORRISON KNUDSEN CORPORATION  
ENVIRONMENTAL SERVICES GROUP

Sheet 3 of 7

Project Number:  
3780-2756

Hole Number  
SL-1

# BOREHOLE LOG

Project: SOUTH LANDFILL RIFTS FIELD INVEST. PART 1

Location: UP GRADIENT TO SOUTH LANDFILL

TIME	ELEVATION	DEPTH BELOW SURFACE (ft)	SAMPLE			STANDARD PENETRATION TEST RESULTS	SYMBOLIC LOG	SOIL DESCRIPTION Name, color, grain size, sorting (or gradation), plasticity, weathering, mineralogy, inclusions, angularity, moisture content.
			INTERVAL	TYPE & NUMBER	% RECOVERY	6"-6"-6" (N)		
1530								<p><u>95-115'</u> POORLY GRADED SAND (SP), MODERATE YELLOWISH BROWN (10YR 5/4), TRACE SILT, FINE TO COARSE GRAINED, DOMINANTLY FINE TO MED. GRAINED, (50-50). 95% QUARTZ, SURROUNDED TO ROUNDED, MOIST</p> <p>NOTE: BELOW 115', ONLY DISCONTINUOUS CUTTINGS RETURNS FROM UNKNOWN DEPTH INTERVALS WERE RETURNED. ALL RETURNS WERE SAND SIMILAR TO THE 95 TO 115' INTERVAL, BUT WITH COARSE SAND AND GRAVEL.</p> <p>SCALE CHANGE</p>
30		125	124.88-126.05	3 split barrel HNU & BACKGROUND	100% (14/14)	25-50(5%)	SP-SW	<p><u>124.88-126.05'</u> POORLY GRADED TO WELL-GRADED SAND (SP-SW), VERY PALE ORANGE (10YR 8/2), 5% GRAVEL TO 20mm, 10-15% COARSE SAND, 65-70% MEDIUM SAND, SAMPLE IS 75-80% QUARTZ, 5% DARK MINERALS, 15% FELDSPAR AND LITHIC CLAYS. ROUNDED-SURROUNDED. TRACE SILT/CLAY SIZED GRAINS, WET</p> <p>PHYSICAL PROPERTY SAMPLE 125.05-125.55 SL1-125-S</p> <p>TOC/METALS SAMPLE 125.55-126.05 SL1-125-T S-CSSMC-103</p>
		126	125.52-125.17	LAB	100% 31 3/4 31 3/4		SP-SW	
11/15/95 0810		126		HNU & BACKGROUND				
		127					SP-SW	<p><u>125.52-128.17</u> POORLY GRADED TO WELL GRADED SAND (SP-SW), VERY PALE ORANGE (10YR 8/2) TO GRAYISH ORANGE (10YR 7/4) 5-10% GRAVELS TO 30mm, 20-25% FINE SAND, 10-15% COARSE SAND SANDS ARE 85-90% QUARTZ GRAVELS ARE FELDSPAR AND LITHIC FRAGMENTS, ROUNDED TO SURROUNDED, TRACE FINES, WET</p>
		128						<p>NOTE: CME CORE COLLECTED ON DAY AFTER SPLIT BARREL SAND FLOWED INTO AUGERS PRIOR TO CME CORE RUN, CAUSING APPARENT OVERLAP OF SAMPLE INTERVAL</p>



MORRISON KNUDSEN CORPORATION  
ENVIRONMENTAL SERVICES GROUP

# BOREHOLE LOG

Sheet 4 of 7  
Project Number:  
3780-2756  
Hole Number  
SL-1

Project: SOUTH LANDFILL RI/FS FIELD INVEST, PART UP GRADIENT TO SOUTH LANDFILL Location:

TIME ELEVATION	DEPTH BELOW SURFACE (F)	SAMPLE			STANDARD PENETRATION TEST RESULTS	SYMBOLIC LOG	SOIL DESCRIPTION  Name, color, grain size, sorting (or gradation), plasticity, weathering, mineralogy, inclusions, angularity, moisture content.
		INTERVAL	TYPE & NUMBER	% RECOVERY	6"-6"-6" (N)		
128							HYDROPUNCH SAMPLE 127-24-128-14. S-C56M6-002
129		128.57 TO 133.47	CME	24% 1 1/2" 58-8"			<p>NOTE: THE INTERVALS 132.3-132.76, 132.76-133.35, AND 133.35-133.47 MAY ALL BE SHIFTED AS A GROUP TO THE TOP OF THE CORE RUN, STARTING AT A DEPTH OF 128.57, DEPENDENT UPON INTERPRETATION OF THIS CORE</p>
130							
131							
132							
133							<p>132.3-132.76' POORLY GRADED SAND, (SP). PALE YELLOWISH BROWN (10YR 6/2), APPROXIMATELY 70% FINE GRAINED, 30% MEDIUM GRAINED SAND TO 1.0 mm, TRACE SILT 96-95% QUARTZ, 5% DARK MINERALS, SUBROUNDED TO ROUNDED. WET</p> <p>132.76-133.35' POORLY GRADED SAND (SP) TO WEL GRADED SAND (SW), AS 125.52-128-17. WET SHARP CONTACT WITH UNDERLYING SP-SM;</p>
134		133.34 TO 138.34	CME	33% 20/60"			<p>133.35-133.47' POORLY GRADED SAND (SP) TO SLOTT SAND (SM). PALE YELLOWISH BROWN (10YR 6/2) FINE GRAINED WITH 5-16% MEDIUM SIZED GRAINS TO 2 mm. 10-15% FINE (SILT) CLAY, 95% QUARTZ, 5% DARK MINERALS PLUS FEEL SPAR. SUBROUNDED TO ROUNDED. SEE DESCRIPTION OF 133.34-133.47 ON NEXT PAGE</p>

MIN &  
BACKGROUND

No Recovery

0905



MORRISON KNUDSEN CORPORATION  
ENVIRONMENTAL SERVICES GROUP

Sheet 5 of 7

Project Number:  
3780-2756

Hole Number  
SL-1

### BOREHOLE LOG

Project: SOUTH LANDFILL RE/FS FIELD INVEST. PART 1

Location: UR GRADIENT TO SOUTH LANDFILL

ELEVATION	DEPTH BELOW SURFACE (Ft)	SAMPLE			STANDARD PENETRATION TEST RESULTS	SYMBOLIC LOG	SOIL DESCRIPTION Name, color, grain size, sorting (or gradation), plasticity, weathering, mineralogy, inclusions, angularity, moisture content.
		INTERVAL	TYPE & NUMBER	% RECOVERY	6"-6"-6" (N)		
134						SP	133.34-133.47 POORLY GRADED SAND (SP) TO SILTY SAND (SM) PALE YELLOWISH BROWN (10YR 6/2), FINE GRAINED SAND (60-70% FINE GRAINED) TO MEDIUM GRAINS NO LARGER THAN 1.0mm, 10-15% SILT, 95% QUARTZ 5% DARK MINERALS SUBROUNDED TO ROUNDED SHARP CONTACT WITH UNDERLYING SAND. WET
135						SP	133.47-134.59 POORLY GRADED SAND (SP). PALE YELLOWISH BROWN (10YR 6/2) TO VERY PALE ORANGE (10YR 8/2), TRACE GRAVEL 5-10% COARSE GRAINED, 30-40% FINE GRAINED SAND. 90% QUARTZ, 5-10% FELDSPAR, 5% DARK MINERALS, ESPECIALLY IN FINES. ROUNDED TO SUBROUNDED. WET
136						No Recovery	134.59-135.01 POORLY GRADED SAND (SP), AS 132.3-132.76. WET
137						No Recovery	NOTE: APPARENT DEPTH OVERLAP OF ABOVE CME CUE TO PRECEDING CME CUE MAY BE DUE TO FIELD MEASUREMENT ERROR, OR FORMATION ENTERING AUGERS, OR THE RECOVERED CORE ACTUALLY REPRESENTING THE DEPTH INTERVAL 128.57-129.74
138							
139							
140							



MORRISON KNUDSEN CORPORATION  
ENVIRONMENTAL SERVICES GROUP

# BOREHOLE LOG

Sheet 6 of 7

Project Number:  
3780-2756

Hole Number  
SL-1

Project: SOUTH LANDFILL RI/FS PART 1 FIELD INLET.

Location: UP GRADIENT TO SOUTH LANDFILL

ELEVATION	DEPTH BELOW SURFACE (ft)	SAMPLE			STANDARD PENETRATION TEST RESULTS	SYMBOLIC LOG	SOIL DESCRIPTION Name, color, grain size, sorting (or gradation), plasticity, weathering, mineralogy, inclusions, angularity, moisture content.
		INTERVAL	TYPE & NUMBER	% RECOVERY	6" 6" 6" (N)		
140							
143							
0950	143.51 to 144.68	3" SPT BARREL		0%	35-50(4)	NO RECOVERY	HYDROPUNCH SAMPLE 145.18-146.08 S-C56MG-003
145							
158							
250	158.26 to 159.36	3" SPT BARREL	45% 6/13 1/4"		30-50(4)	SW	158.26-159.36 WELL GRADED SAND (SW), PALE YELLOWISH BROWN (18YR 6/2), 15% GRAVEL TO 20mm, 15% COARSE SAND, 60% FINE TO MEDIUM SAND TRACE TO ABSENCE OF SILT. 75-80% QUARTZ, 15-20% PLEOSPAN PLUS LITHIC CLASTS, 5% DARK MINERALS. UET. CORE LOSS DEPTHS UNKNOWN. TOC/METALS SAMPLE 158.9-159.9 SL1-159-S S-C55MG-104 HYDROPUNCH SAMPLE 160.02-160.92 S-C56MG-004
159	159.36 to 160.02	0.2 UNITS					
160							



MORRISON KNUDSEN CORPORATION  
ENVIRONMENTAL SERVICES GROUP

Sheet 7 of 7  
Project Number:  
3780-2756  
Hole Number  
SL-1

### BOREHOLE LOG

Project: SOUTH LANDFILL RI/FS FIELD INVESTIGATION PALE 1 | Location: UP-GRADE TO SOUTH LANDFILL

TIME

ELEVATION	DEPTH BELOW SURFACE (ft)	SAMPLE			STANDARD PENETRATION TEST RESULTS	SYMBOLIC LOG	SOIL DESCRIPTION Name, color, grain size, sorting (or gradation), plasticity, weathering, mineralogy, inclusions, angularity, moisture content.
		INTERVAL	TYPE & NUMBER	% RECOVERY	6" - 6" - 6" (S)		
170	178.07 TO 179.29	3' SAND BARREL	0% 9/14"	17-50(S)	SW	178-07 - 179-24 WELL GRADED SAND (SW). FALE. YELLOWISH BROWN (10YR 6/2), 10-15% GRAVEL TO 10mm, 40-50% COARSE SAND? PLUS GRAVEL, 70% QUARTZ, 25% FELDSPAR PLUS LIMONITE, 5% DARK MINERALS, SUBROUNDED TO ROUNDED	
179					RECOVERY IN SAND NO RECOVERY TO SAMPLE	HYDROPHONUM SAMPLE 179-10-180.0 S-C56MG-005	
180						TD, 80.0	

1440



MORRISON KNUDSEN CORPORATION  
ENVIRONMENTAL SERVICES GROUP

BOREHOLE LOG

Sheet 1 of 5

Project Number:  
3780 2756

Hole Number  
SL-2

Project: SOUTH LANDFILL REEF FIELD INVESTIGATION, PART 1 Location: MID LANDFILL, NE CORNER OF RD/CULVERT

Coordinates: N-273928.169 E-2094218.170 Drilling Contractor: J & L DRILLING SERVICES

Drill Make and Model / Drilling Method: CME 750 / HOLLOW STEM AUGER Depth Top of Rock: NA Depth Casing & Size: Hole Size: 7 1/2" EXPANDED TO 10 1/2"

Elevation: 1911.8 Angle from Vert. and Bearing: VERTICAL Depth Bottom of Hole:

Water Level: Fluid & Additives: WATER Date Start: 5/14/95 Date Finish: Logger: PAUL WELLS

TIME  
8:20

ELEVATION	DEPTH BELOW SURFACE (ft)	SAMPLE			STANDARD PENETRATION TEST RESULTS	SYMBOLIC LOG	SOIL DESCRIPTION
		INTERVAL	TYPE & NUMBER	% RECOVERY	5"-5"-5" (N)		
						CL	0-2' LEAN CLAY (CL), GRAYISH BROWN (5YR 2/2) MEDIUM PLASTICITY, MOIST
						CL	2-7' LEAN CLAY (CL), DARK YELLOWISH BROWN (10YR 4/2) MEDIUM PLASTICITY, MOIST
10						CL-CH	7-13' LEAN CLAY TO FAT CLAY (CL-CH), DUSKY YELLOWISH BROWN (10YR 2/2), MEDIUM TO HIGH PLASTICITY, MOIST
						CL	13-33' LEAN CLAY (CL), DARK YELLOWISH BROWN (10YR 4/2), MEDIUM PLASTICITY, 5-10% SILT SIZED CLAYS, QUARTZOSIS, MOIST
20	19.24-20.74	3" split barrel		100%	4-9-12	CL	19.24-20.74' LEAN CLAY (CL), MODERATE YELLOWISH BROWN (10YR 5/4), MEDIUM TO LOW PLASTICITY, NO SAND, 5% DUSKY BROWN NODULES (OXIDIZED ORGANICS (?)). <u>LOESS</u> PHYSICAL PROPERTIES SAMPLE 19.74-20.24' SL2-20-S TOC/METALS SAMPLE 20.24-20.74' SL2-20-S SCSSMC-105
30						CL	33-36' LEAN CLAY TO FAT CLAY (CL-CH), DARK YELLOWISH BROWN (10YR 4/2), MEDIUM TO HIGH PLASTICITY, MOIST
						CL	36-50' LEAN CLAY (CL), DARK YELLOWISH BROWN (10YR 4/2) TO MODERATE YELLOWISH BROWN (10YR 5/4) MEDIUM PLASTICITY, MOIST
40							
50							

1920

990

45

CUTTINGS

19.24-20.74  
3" split barrel  
HNU  
BACKLOG

HNU &  
BACKLOG



MORRISON KNUDSEN CORPORATION  
ENVIRONMENTAL SERVICES GROUP

Sheet 2 of 5  
Project Number:  
3780 2756  
Hole Number:  
SL-2

**BOREHOLE LOG**

Project: SOUTH LANDFILL RIFIS FIELD INVESTIGATION Part 1 Location: MID LANDFILL, NORTHEAST SIDE OF INTERSECTION BETWEEN ROAD & CULVERT

TIME	ELEVATION	DEPTH BELOW SURFACE (ft)	SAMPLE			STANDARD PENETRATION TEST RESULTS	SYMBOLIC LOG	SOIL DESCRIPTION Name, color, grain size, sorting (or gradation), plasticity, weathering, mineralogy, inclusions, angularity, moisture content.
			INTERVAL	TYPE & NUMBER	% RECOVERY	6"-6"-6" (N)		
1030		60					CL	50-80, LEAN CLAY (CL), DARK YELLOWISH BROWN (10 YR 4/2) TO MODERATE YELLOWISH BROWN (10 YR 5/4) LOW TO MEDIUM PLASTICITY, 5-10% QUARTZ & FINE SAND TO 0.25 mm, MOIST
1045								
		80					SM	80-85 SILTY SAND (SM), DARK YELLOWISH BROWN (10 YR 4/2), FINE TO MEDIUM GRAINED (5-10% OF SAND MEDIUM) TO 2.0 mm, QUARTZOSE, ROUNDED, SUBROUNDED, 30% SILT, SAMPLE HAS LOW PLASTICITY, MOIST
1100								
		90					SM	85-95 SILTY SAND (SM), MODERATE YELLOWISH BROWN (10 YR 5/4), FINE TO MEDIUM GRAINED (5-10% OF SAND MEDIUM) TO 2.0 mm; 90-95% QUARTZ, 5-10% DARK MINERALS PLUS FELDSPAR, ROUNDED TO SUBROUNDED, 25% SILT, NON-PLASTIC
1105								
		100					SP	95-100' POORLY GRADED SAND (SP), GRAYISH ORANGE (10 YR 7/4) TO MODERATE YELLOWISH BROWN (10 YR 5/4), FINE GRAINED (<0.25 mm) 90-95% QUARTZ, 5-10% DARK MINERALS PLUS FELDSPAR, SUBANGULAR TO ROUNDED, TRACE SILT.
1125								
		110					SM	100-110' SILTY SAND (SM), AS 80-85', EXCEPT 10-15% SILT, NON PLASTIC, 2 mm MAXIMUM GRAIN SIZE.

W/NO BACKGROUND

CUTTINGS

W/NO BACKGROUND

W/NO 0.2

W/NO 0.4



MORRISON KNUDSEN CORPORATION  
ENVIRONMENTAL SERVICES GROUP

BOREHOLE LOG

Sheet 3 of 5

Project Number:  
3780 2756

Hole Number  
SL-2

Project: SOUTH LAWRANCE RIFES FIELD INVESTIGATION, Part 1

Location: MID WINDFILL, NORTHWEST SIDE OF INTERSECTION BETWEEN ROAD & CULVERT

TIME	ELEVATION	DEPTH BELOW SURFACE (ft)	SAMPLE			STANDARD PENETRATION TEST RESULTS	SYMBOLIC LOG	SOIL DESCRIPTION Name, color, grain size, sorting (or gradation), plasticity, weathering, mineralogy, inclusions, angularity, moisture content.
			INTERVAL	TYPE & NUMBER	% RECOVERY	6"-6"-6" (N)		
1145		119	HNU 0.1				SP	110-115' POORLY GRADED SAND (SP), GRAYISH ORANGE (10YR 7/4) TO MODERATE YELLOWISH BROWN (10YR 5/4), FINE TO COARSE SAND (50-60% FINE, 5% COARSE) 4mm MAXIMUM SIZE, 90-95% QUARTZ, 5% DARK MINERALS PLUS FELDSPAR, SUBANGULAR-ROUNDED. MOIST. WATER 115-8' BGS 5/15/85 NO CUTTINGS RETURNED PAST 115'
		120	HNU 0.2					
1340		125	125.05 TO 126.35	3" SPLITS BARRETT	59% 10.6" 18	9.24-34	SP	125.05-126.55 POORLY GRADED SAND (SP), GRAYISH ORANGE (10YR 7/4), FINE TO COARSE SAND, <5% GRAVEL, (5-10% COARSE SAND, 60-65% 0.5 to 2mm), 85-90% QUARTZ, 5-10% DARK MINERALS ESP. IN FINE & GRAINING SIZE, 5-10% FELDSPAR, ROUNDED TO SUBROUNDED. WGT. TRACE SILT
		126	HNU 0.2	UNIT			SW	PHYSICAL PROPERTY SAMPLE 125.55-126.05* SLZ-125-5 TOC/METALS SAMPLE 126.05-126.55* SLZ-125-5 S-C55ML-106 HYDROPHOBIC SAMPLE: 127.47-128.37 SLZ-126 S-C56ML-001
1510		127	125.32-128.61	CME (START DEPTH 125.72)	25% 39% 63%			125.32-128.61 - CME RUN 125.32-125.84' POORLY GRADED SAND (SP), PALE YELLOWISH BROWN (10YR 6/2), 20-30% FINE GRAINED SAND, 5-10% COARSE GRAINED SAND, 90% QUARTZ, 5% FELDSPAR, 5% DARK MINERALS, ROUNDED TO SUBROUNDED. AT BASE OF UNIT, 5% GRAVEL, CLASTS TO 40mm, WGT, TRACE SILT
		128	HNU 0.1	UNIT				125.84-127.42' WELL GRADED SAND (SW), GRAYISH ORANGE (10YR 7/4), 10% GRAVEL TO 48mm CLASTS, 20% COARSE SAND, 10-15% FINE SAND, 25% SILT. GRAVELS ARE LITHIC, FELDSPAR, AND QUARTZ CLASTS, SANDS ARE
		129						

\* COMPARISON OF SAMPLING DEPTH INTERVALS, LENGTH RECOVERED, AND LITHOLOGY BETWEEN SPLIT





MORRISON KNUDSEN CORPORATION  
ENVIRONMENTAL SERVICES GROUP

BOREHOLE LOG

Sheet 4 of 5  
Project Number:  
3784 2756  
Hole Number  
SL-2

Project: SOUTH LANDFILL RE/FS FIELD INVESTIGATION, Part 1 Location: MID LANDFILL, NE CORNER OF INTERSECTION OF ROAD AND CULVERT

ELEVATION	DEPTH BELOW SURFACE (')	SAMPLE			STANDARD PENETRATION TEST RESULTS	SYMBOLIC LOG	SOIL DESCRIPTION Name, color, grain size, sorting (or gradation), plasticity, weathering, mineralogy, inclusions, angularity, moisture content.
		INTERVAL	TYPE & NUMBER	% RECOVERY	0" 5" 10"		
129	129.03 TO 133.59	CME		18% 10% 54.7		SW SP SP	70-80% QUARTZ, 15-20% FELDSPAR, 5% DARK MINERALS, ROUNDED TO SUBROUNDED  129.03-129.16 WELL GRADED SAND WITH GRAVEL (SW), VERY PALE ORANGE (10YR 8/2), 30% GRAVEL, 70% SAND (15% COARSE SAND) GRAVELS ARE APPROXIMATELY 50% FELDSPAR AND LITHIC CLUSTS. SANDS ARE APPROXIMATELY 75% QUARTZ, TRACE OF SILT IN SAMPLE, SUBROUNDED, WET
130						SP-SM	129.16-129.32 POORLY GRADED SAND (SP), CLAYISH ORANGE (10YR 7/4), DOMINANTLY FINE GRAINED, 5-10% SILT, 95%, 5% DARK MINERALS PLUS FELDSPAR, SUBANGULAR TO ROUNDED, WET
131							129.32-129.57 POORLY GRADED SAND (SP), CLAYISH ORANGE (10YR 7/4) FINE SAND, 90-95% LESS THAN 0.1mm, 5-10% MEDIUM SAND TO 1.0mm, 5-10% SILT. MINOR LAYERS PRESENT CONTAINING COARSE SAND OR GRAVEL. 95% QUARTZ, SUBANGULAR TO ROUNDED
132							129.57-129.86' POORLY GRADED SAND TO SILTY SAND (SP-SM). YELLOWISH CLAY (5Y 7/2) 70-80% FINE SAND, 10-15% MEDIUM SAND, 16-15% SILT, 95% QUARTZ, 5% MICAS, DARK MINERALS, SUBANGULAR TO SUBROUNDED.
133							133.5 TO 135.57 SAND
134				69% 16.5" 24"	5-10-30	SP-SW	133.5-135.57 POORLY TO WELL GRADED SAND (SP-SW), PALE YELLOWISH BROWN (10YR 6/2), TRACE GRAVEL TO 10mm, 5-10% COARSE SAND, 65% MEDIUM SAND, TRACE SILT, 90% QUARTZ, 45% DARK MINERALS, 5-10% LITHIC CLASTS AND FELDSPAR, SUBROUNDED, WET.

NO RECOVERY

1615

HAND 0.4 UNITS

HAND 0.2 UNITS

FROM PAGE 3



**BOREHOLE LOG**

Project: SOUTH CAMPFILL RISKS FIELD INVESTIGATION SURV 1

Location: MID CAMPFILL, NORTHWEST SIDE OF INTERSECTION OF ROAD AND CULVERT

ELEVATION	DEPTH BELOW SURFACE (ft)	SAMPLE			STANDARD PENETRATION TEST RESULTS	SYMBOLIC LOG	SOIL DESCRIPTION Name, color, grain size, sorting (or gradation), plasticity, weathering, mineralogy, inclusions, angularity, moisture content.
		INTERVAL	TYPE & NUMBER	% RECOVERY	0" - 6" - 6" (3)		
	136						CONTINUED FROM PAGE 4 PHYSICAL PROPERTY SAMPLE 134.57-135.07 *SL2-134 TOC/METALS SAMPLE 135.07-135.57* SL2-134-5 5-C55M6-107 HYDROPHOBIC SAMPLE 136.27-137.17 *SL2-137 5-C56M6-006
	138						
1750	139	138.81 TO 139.81 HOLE 0.20 INCHES	2" SPLIT SPOON	100 12 1/2	26-50(6)	SW SP	138.81-139.14 WELL GRADED SAND (SW), CLAYISH ORANGE (10YR 7/4), 5-10% CLAY, 20-25% COARSE SAND, 20% FINE SAND, TRACE SILT, 70-75% QUARTZ IN FINE-MEDIUM SANDS, FELDSPAR AND LITHIC CLASTS RESIDUE IN COARSE SANDS AND GRAVEL, SUBROUNDED, WET TRANSITION TO: 139.14-139.81 POORLY GRADED SAND (SP), CLAYISH ORANGE (10YR 7/4), 40% MEDIUM SAND IN 0.5-2mm RANGE, 20% COARSE SAND IN 2-5mm RANGE, 45% SILT, 90% QUARTZ, 5-10% FELDSPAR, SUBROUNDED TO ROUND, WET. TD 139.81

REVIEW OF THE SAMPLE RECOVERY INDICATES THAT THE SAMPLE DEPTHS SHOULD BE RAISED BY 0.12 FEET



**MORRISON KNUDSEN CORPORATION**  
**ENVIRONMENTAL SERVICES GROUP**

Sheet 1 of 3

Project Number:  
2756-01

Hole Number  
SL-3

**BOREHOLE LOG**

Project: South Landfill RIFFS Location: Hastings, Ne

Coordinates: N-274392.318 E-2094113.770 Drilling Contractor: J+R Drilling

Drill Make and Model / Drilling Method: CME 75 (ATV) / Hollow Stem Auger Depth Top of Rock: \_\_\_\_\_ Depth Casing & Size: 4" pvc 138' Hole Size: 10 1/4"

Elevation: 1911.6 Angle from Vert. and Bearing: Vert. Depth Bottom of Hole: 140'

Water Level: 115.89 Fluid & Additives: None Date Start: 950615 Date Finish: 950616 Logger: Peter Berglund

ELEVATION	DEPTH BELOW SURFACE (ft)	SAMPLE			STANDARD PENETRATION TEST RESULTS	SYMBOLIC LOG	SOIL DESCRIPTION Name, color, grain size, sorting (or gradation), plasticity, weathering, mineralogy, inclusions, angularity, moisture content.
		INTERVAL	TYPE & NUMBER	% RECOVERY	6"-6"-6" (N)		
						CL	<u>0-3</u> topsoil
							<u>3-6</u> garbage - wood + dirt, scattered construction debris, <10% debris
						CH	<u>6-8</u> gray silty clay, fat, damp
10						CL	<u>8-14</u> orange-brown sandy clay (fat) scattered very fine sand grains
							<u>14-30</u> dark brown fat clay with some silt very scattered vf and fine sand grains
20						CH-CL	
							<u>30-35</u> vf to fine grain sand, orange brown w/ scattered clay and silt - ~20% sand rounded to sub-rounded, damp
30						SM	
							<u>35-38</u> dark brown same as above with slightly higher clay content - 20% clay, 10% silt
40						SM	
							<u>38-42</u> same as 30-35' interval
						SM	
							<u>42-85</u> silty fat clay to lean clay - med to dark brown, damp, little to no v.f. sands
50						CL	

Hnu @ Berglund

Hnu @ Berglund Cuttings

Hnu @ Berglund Cuttings

Hnu @ Berglund Cuttings



**MORRISON KNUDSEN CORPORATION**  
**ENVIRONMENTAL SERVICES GROUP**

Sheet 2 of 3

Project Number:  
2756-01

Hole Number  
SL-3

**BOREHOLE LOG**

Project: South Landfill RI/FS

Location: Hastings, Ne.

ELEVATION	DEPTH BELOW SURFACE (ft)	SAMPLE			STANDARD PENETRATION TEST RESULTS	SYMBOLIC LOG	SOIL DESCRIPTION Name, color, grain size, sorting (or gradation), plasticity, weathering, mineralogy, inclusions, angularity, moisture content.
		INTERVAL	TYPE & NUMBER	% RECOVERY	5"-5"-5"		
					(N)		
		<u>None @ 36 1/2'</u>	<u>Cuttings</u>				
	60	<u>None @ 34 1/2'</u>	<u>Cuttings</u>				
	70						
	80	<u>None @ 34 1/2'</u>	<u>Cuttings</u>				
	90	<u>None @ 34 1/2'</u>				<u>SW</u>	<u>85-119.5 fine to medium grain sand w/ scattered v. coarse grains and some grains up to 1/4" diameter, larger grains tend to be flat while the smaller grains are subrounded, poorly sorted.</u>
	100						
	110						



**BOREHOLE LOG**

Project: South Landfill R/FC

Location: Hastings, Ne

ELEVATION	DEPTH BELOW SURFACE (ft)	SAMPLE			STANDARD PENETRATION TEST RESULTS	SYMBOLIC LOG	SOIL DESCRIPTION Name, color, grain size, sorting (or gradation), plasticity, weathering, mineralogy, inclusions, angularity, moisture content.
		INTERVAL	TYPE & NUMBER	% RECOVERY	6" - 6" - 6"		
					(N)		
		<u>fine @ 119.5</u>					
	120	<u>fine @ 120</u>	split spoon 50% NC SAMPLE RECOVERY			SW	<u>119.5-120</u> medium to very coarse sand, sub rounded to rounded, poorly sorted, mostly quartz (60-70%) rest is feldspar + plagioclase
		<u>fine @ 124</u>	CME	37%		SW	<u>124-133</u> same as 119.5-120 with scattered pea gravel with some gravels up to 1" diameter
	130	<u>fine @ 130</u>	CME	40%			
		<u>fine @ 133</u>	CME			SM	<u>133-139 1/2</u> silty sand, silty with some clay (< 5% v.f. to coarse sand, scattered v. coarse grains material holds together as if clayey - not cemented - massive, med brown color. 133 to 133.2 there was a layer of rusty orange stained material - material same as rest of interval.
	140	<u>fine @ 140</u>	split spoon				



MORRISON KNUDSEN CORPORATION  
ENVIRONMENTAL SERVICES GROUP

**BOREHOLE LOG**

Sheet 1 of 4  
Project Number:  
2756-01  
Hole Number  
SL-4d

Project: South Landfill RI/FS Location: Hastings, Ne  
Coordinates: N-273785.993 E-2094684.000 Drilling Contractor: J+R Drilling  
Drill Make and Model / Drilling Method: CME ATV / Hollow Stem Auger Depth Top of Rock: Depth Casing & Size: 179' / 2" pvc Hole Size: 8"  
Elevation: 1913.3 Angle from Vert. and Bearing: Vert. Depth Bottom of Hole: 179'  
Water Level: 118.26 bgs Fluid & Additives: NA Date Start: 5/31/95 Date Finish: 6/2/95 Logger: Peter R Berglund

ELEVATION	DEPTH BELOW SURFACE (F)	SAMPLE			STANDARD PENETRATION TEST RESULTS	SYMBOLIC LOG	SOIL DESCRIPTION Name, color, grain size, sorting (or gradation), plasticity, weathering, mineralogy, inclusions, angularity, moisture content.
		INTERVAL	TYPE & NUMBER	% RECOVERY	6"-6"-6" (N)		
						CL	<u>0-2</u> dark brown sandy clayey silt - topsoil
						CH	<u>2-27</u> brown silty clay, fat, moist
1413	10	Hand Bled					
1421	20	Hand Bled	cuttings				
1429	30	Hand Bled	cuttings			CH	<u>27-35</u> Same as above, drk brown
1431	40	Hand Bled	cuttings			CH	<u>35-52</u> Same as above, medium brown
1446	50	Hand Bled	cuttings				



MORRISON KNUDSEN CORPORATION  
ENVIRONMENTAL SERVICES GROUP

BOREHOLE LOG

Sheet 2 of 4

Project Number:  
2756-01

Hole Number  
SL-4d

Project: South Landfill RI/FS

Location: Hastings, Ne

ELEVATION	DEPTH BELOW SURFACE (F)	SAMPLE			STANDARD PENETRATION TEST RESULTS	SYMBOLIC LOG	SOIL DESCRIPTION Name, color, grain size, sorting (or gradation), plasticity, weathering, mineralogy, inclusions, angularity, moisture content.
		INTERVAL	TYPE & NUMBER	% RECOVERY	6"-5"-6" (N)		
1458	60	Hand @ Blgs	Cuttings			SM	52-65 decreasing amounts of clay, more silt with some v.f. sand, damp
1542	70	Hand @ Blgs	split spoon	100%	11-34-39	CL	65-66 1/2 light brown-gray, silty clay. vertical iron staining (looks like roots) also small carbonaceous specs scattered throughout 35% silt 65% clay
1556	80	Hand @ Blgs	Cuttings				
1630	90	Hand @ Blgs	split spoon	100%	12-30-36	CL	95-96 1/2 yellow brown clayey silt, 80-85% silt scattered drk brown to reddish tint (organic) material changes to gray (96-96 1/2) green clayey silt, no sand, scattered green clay nodules up to 1/8" in diameter
1715	100	Hand @ Blgs	split spoon	100%	15-47-50	CL	105-106 1/2 yellow green with scattered gray + green nodules. silty clay some yellow to rusty orange. Colored nodules of v.f. grain sand to silt size particles
1739	110	Hand @ Blgs					



**BOREHOLE LOG**

Project: South Landfill RI/FS

Location: Hastings, Ne

ELEVATION	DEPTH BELOW SURFACE (M)	SAMPLE			STANDARD PENETRATION TEST RESULTS	SYMBOLIC LOG	SOIL DESCRIPTION
		INTERVAL	TYPE & NUMBER	% RECOVERY	6"-6"-6" (N)		
1755 5131	120	Hnu @ Bkgal					<u>106-106.5</u> gray green to yellow orange vf and fine grain sand, well sorted subangular to rounded
			Split spoon	100% 40% 124.5-129	4-14-23-27	SW	<u>124.5-126.5</u> fine to very coarse grain sand predominately quartz with scattered plagioclase and feldspars. 80% quartz. poorly sorted mod. rounded
1045 611	130	Hnu @ Bkgal		10% 124-134		SW	<u>126.5-129</u> - stuff mostly - potentially finer grain material in shoe <u>129-134</u> fine to very coarse grains sand well sorted 70% quartz with 30% feldspar + phly subangular to subrounded. med brown w/slight green hugh - some gray clayey material smeared on drive shoe.
			CME	70% 134-139		SM	
					5-13-24-47	SM	
1140	140	Hnu @ Bkgal	split spoon	3%			<u>135-136</u> silty, vf to f grain sand, 5-10% clay, dense subrounded to rounded well sorted, wet
							<u>136-136.3</u> fine to coarse grain sand with scattered pebbles and gravel (3 pieces 1/2" x 1"). It brown, iron staining, subrounded, poorly sorted wet
	150	Hnu @ Bkgal	Cuttings				<u>136.3-138</u> silty to very fine grain sand, dense, gray-brown sub-rounded, well sorted, wet
							<u>138-139</u> silty, very fine to coarse grain sand 10-15% coarse grains, 10-15% silts, 70-80% vf. fomed grain sand, <5% clay, subrounded to rounded moderately sorted, wet.
1430	160	Hnu @ Bkgal	split spoon	0%	50-73	SW	<u>160-161</u> fine to medium grain sand, scattered coarse grains, some pebbles size. few fines, sub-rounded to rounded, moderately sorted, wet
	170	Hnu @ Bkgal	Cuttings				





**MORRISON KNUDSEN CORPORATION**  
**ENVIRONMENTAL SERVICES GROUP**

Sheet 4 of 4

Project Number:  
2756-01

Hole Number  
SL-4d

**BOREHOLE LOG**

Project: South Landfill RI/FS

Location: Hastings, Ne

ELEVATION	DEPTH BELOW SURFACE (m)	SAMPLE			STANDARD PENETRATION TEST RESULTS	SYMBOLIC LOG	SOIL DESCRIPTION Name, color, grain size, sorting (or gradation), plasticity, weathering, mineralogy, inclusions, angularity, moisture content.
		INTERVAL	TYPE & NUMBER	% RECOVERY	6" 6" 6" (3)		
1635	180		splits	0% open	7-32 50(5/2)		



MORRISON KNUDSEN CORPORATION  
ENVIRONMENTAL SERVICES GROUP

**BOREHOLE LOG**

Sheet 1 of 4  
Project Number:  
2756-C1  
Hole Number  
SL-5d

Project: South Landfill RI/FS Location: Hastings, Ne  
Coordinates: N-274351.044 E-2094671.500 Drilling Contractor: J+R Drilling  
Drill Make and Model / Drilling Method: CME ATV / Hollow Stem Auger Depth Top of Rock: Depth Casing & Size: Hole Size: 8  
Elevation: 1913.1 Angle from Vert. and Bearing: Vert Depth Bottom of Hole: 179'  
Water Level: 118.15 Fluid & Additives: None Date Start: 5/19/95 Date Finish: 5/21/95 Logger: Peter R Berglund

ELEVATION	DEPTH BELOW SURFACE (F)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6"-5"-6" (N)	SYMBOLIC LOG	SOIL DESCRIPTION Name, color, grain size, sorting (or gradation), plasticity, weathering, mineralogy, inclusions, angularity, moisture content.
		INTERVAL	TYPE & NUMBER	* RECOVERY			
			cuttings			CL	<u>0-2</u> topsoil
						CH	<u>2-18</u> brown silty clay, fat, moist, very little to no v.f sand
	10		cuttings				
			cuttings				
	20					CH	<u>18-31</u> medium to dark gray, silty clay, fat moist, very little to no v.f. grain sand.
1040	30		cuttings			CH	<u>31-34</u> same as above, color change to dark gray-brown
							<u>34-44</u> gray brown silty clayey fine sand 20-25% silt + clay, damp to dry
	40		cuttings			SC	
							<u>44-55</u> v.f. grain sandy silty clay drk gray damp to dry
1056	50		cuttings			CL	



MORRISON KNUDSEN CORPORATION  
ENVIRONMENTAL SERVICES GROUP

**BOREHOLE LOG**

Sheet 2 of 4

Project Number:  
2756-01

Hole Number  
SL-5d

Project: South Landfill RI/FS

Location: Hastings, Ne.

ELEVATION	DEPTH BELOW SURFACE (M)	SAMPLE			STANDARD PENETRATION TEST RESULTS	SYMBOLIC LOG	SOIL DESCRIPTION Name, color, grain size, sorting (or gradation), plasticity, weathering, mineralogy, inclusions, angularity, moisture content.
		INTERVAL	TYPE & NUMBER	% RECOVERY	6"-5"-5" (N)		
						CL	
	60	Hwy @ Bkgd	Cuttings			CL	<u>55-74</u> med brown silty clay with scattered v.f. sand. Color changing between brown and gray.
1109	70	Hwy @ Bkgd	Cuttings			CL	
		Hwy @ Bkgd	split spoon			CL	<u>74-75</u> lt. brown clayey silt w/ scattered v.f. to fine sand. Subangular, dry
	80						
125	90	Hwy @ Bkgd	Cuttings			CL	<u>90-95</u> from cuttings - clayey silt (15-20%) v.f. to fine grain sand, well sorted, sub rounded, dry
	100	Hwy @ Bkgd	Cuttings			SM	<u>95-120</u> from cuttings - fine grain sand, few silts (~5%) scattered
	110						



**BOREHOLE LOG**

Project: South Landfill RI/FS

Location: Hastings, Ne

ELEVATION	DEPTH BELOW SURFACE (ft)	SAMPLE			STANDARD PENETRATION TEST RESULTS	SYMBOLIC LOG	SOIL DESCRIPTION Name, color, grain size, sorting (or gradation), plasticity, weathering, mineralogy, inclusions, angularity, moisture content.
		INTERVAL	TYPE & NUMBER	% RECOVERY	6"-6"-6" (N)		
1328						SM	
	120		split spec n			SW	120-121 fine to coarse grain sand w/ scattered gravels, saturated
			CME 60%			SW	121-124 medium to very coarse sand with up to 1" gravels moderately to poorly sorted rounded, lt to medium brown
			CME 30%			SW	124-124.5 fine to medium grain sand w/o anything larger than scattered coarse to very coarse grains.
	130		CME 0%				124.5-129.5 fine to very coarse grain sand, scattered gravel up to 1" x 2" size. p predominately quartz w/ some feldspar subangular to subrounded, saturated small veins + nodules of clayey material widely scattered.
			CME 54%			SW	135-140 vf. to fine grain sand w/ scattered coarse grain to pea gravel, lt brown ~ 5% silty material, saturated
	140		split spec n 65%			SW	140-141 same as above
	150						
	160		split spec n 0%				
	170						

*Handwritten notes:*  
 Ann @ Ben  
 Ann @ Ben



**MORRISON KNUDSEN CORPORATION**  
 ENVIRONMENTAL SERVICES GROUP

Sheet 4 of 4

Project Number:  
 3780-2756-01

Hole Number  
 SL-5d

**BOREHOLE LOG**

Project: South Landfill RI/FS

Location: Hastings, Ne

ELEVATION	DEPTH BELOW SURFACE (m)	SAMPLE			STANDARD PENETRATION TEST RESULTS	SYMBOLIC LOG	SOIL DESCRIPTION Name, color, grain size, sorting (or gradation), plasticity, weathering, mineralogy, inclusions, angularity, moisture content.
		INTERVAL	TYPE & NUMBER	% RECOVERY	6" 6" 6" (3)		
	180		Split Spoon			SP	179.3 - 180.3 Lt. to medium brown, silty, fine to very coarse gravel. traces of clay. scattered gravel up to 1/4" diameter, sub angular to subrounded, poorly sorted

# ATTACHMENT C

# STATE OF NEBRASKA



DEPARTMENT OF ENVIRONMENTAL QUALITY

Randolph Wood

Director

Suite 400, The Atrium

1200 N Street

P.O. Box 98922

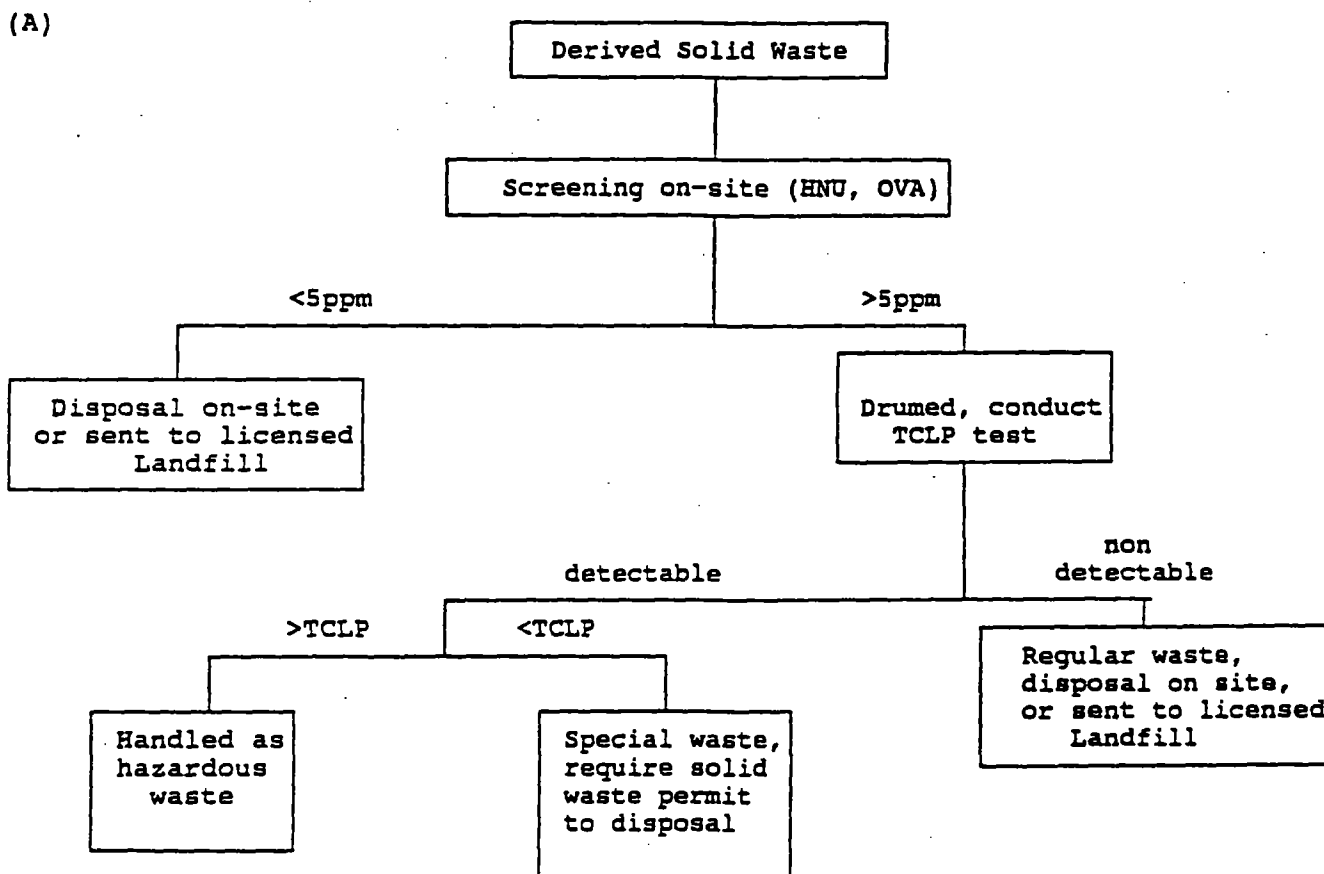
Lincoln, Nebraska 68509-8922

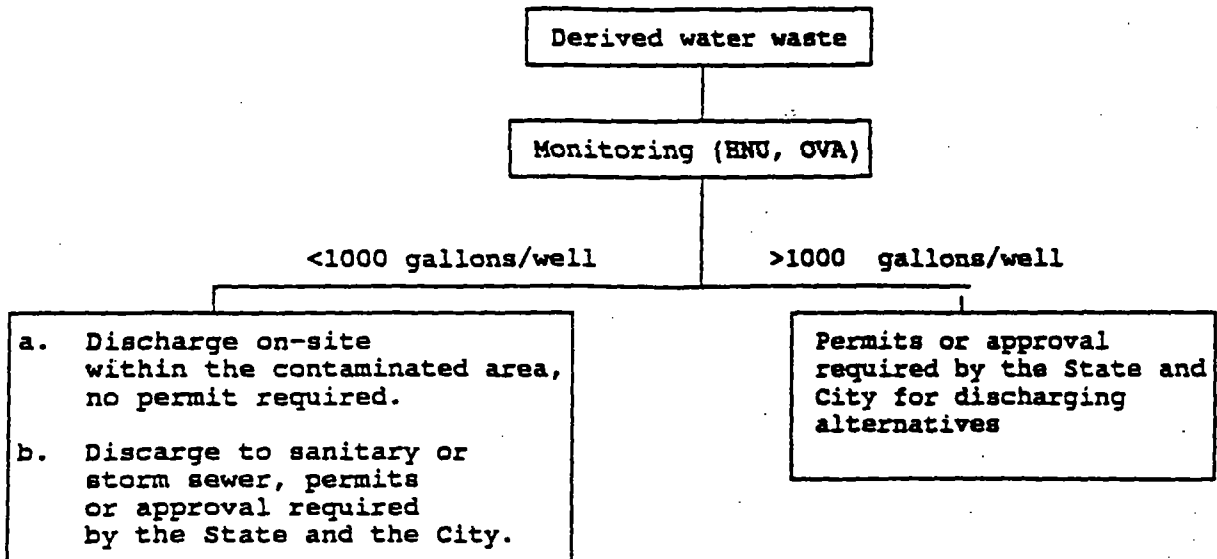
Phone (402) 471-2186

May 9, 1994

E. Benjamin Nelson  
Governor

In order to clarify some of the confusions regarding field investigation derived wastes generated at Superfund sites in Nebraska, the Nebraska Department of Environmental Quality has constructed a Decision Tree as follows to provide a generalized guideline for you to make up a plan for the site, and/or to contact the right section for obtaining the necessary permits and/or approvals. Please be aware that this is a guideline for conducting field work at a VOC contaminated superfund sites at the present time, and the contractor has the responsibility to determine and handle waste in accordance with regulations.





For solid disposal approval you may contact:

Steve Kemp (402) 471-4210

or Kelly Danielson (402) 471-4210

Integrated Waste Management Section

Air and Waste Management Division

NDEQ

For water discharge permits or approval you may contact:

Clark Smith (402) 471-4209

or Ron Asch (402) 471-2188

Permits and Compliances Section

NDEQ

For Hazardous Waste ID# or questions you may contact:

Teri Swarts (402) 471-4217

Hazardous Waste Section

Air and Waste Management Division

NDEQ

KD/ds



# ATTACHMENT D

**Investigation Derived Waste Summary  
South Landfill RI/FS, Part I Field Investigation—May, 1995**

<b>Well Location</b>	<b>Sample Depth</b>	<b>HNu (PID) Reading</b>	<b>Well Location</b>	<b>Sample Depth</b>	<b>HNu (PID) Reading</b>
SL-1	0 to 5 feet	0.2	SL-2	0 to 5 feet	No Sample Screened
	10 to 15 feet	0.2		10 to 15 feet	No Sample Screened
	20 to 25 feet	0.2		20 to 25 feet	At background
	30 to 35 feet	0.2		30 to 35 feet	At background
	40 to 45 feet	0.2		40 to 45 feet	At background
	50 to 55 feet	0.2		50 to 55 feet	At background
	60 to 65 feet	0.2		60 to 65 feet	At background
	70 to 75 feet	0.2		70 to 75 feet	At background
	80 to 85 feet	0.1		80 to 85 feet	At background
	90 to 95 feet	0.2		90 to 95 feet	At background
	100 to 105 feet	0.2		100 to 105 feet	At background
	110 to 115 feet	0.2		110 to 115 feet	At background
	120 to 180 feet	No cuttings samples collected at surface		120 to 140 feet	No cuttings samples collected at surface
	Core;124.9-126.0	At background		Core;125.0-126.5	0.2
	Core;125.5-128.2	At background		Core;125.3-128.6	0.1
	Core;128.6-133.5	At background		Core;129.0-133.6	0.4
	Core;158.3-159.4	0.2		Core;133.5-135.6	0.2
	Waste Bin	At background		Core;138.8-139.8	0.2
				Waste Bin	At background

Notes: HNu readings not "At background" are the needle deflection over background in parts per million (ppm)  
Background readings mean that the measurement did not change from ambient air readings

Investigation Derived Wastes Summary  
South Landfill RI/FS, Part 1 Field Investigation-May/June, 1995

Well Location	Sample Depth	HNu (PID) Reading
SL-4	0 to 5 feet	At Background
	10 to 15 feet	At Background
	20 to 25 feet	At Background
	30 to 35 feet	At Background
	40 to 45 feet	At Background
	50 to 55 feet	At Background
	60 to 65 feet	At Background
	70 to 75 feet	At Background
	80 to 85 feet	At Background
	90 to 95 feet	At Background
	100 to 105 feet	At Background
	110 to 115 feet	At Background
	120 to 125 feet	At Background
	Core;126.5 to 129	At Background
	Core;129 to 134	At Background
	Core;134 to 139	At Background
	Core;139 to 140	At Background
	Waste Bin	At Background

Well Location	Sample Depth	HNu (PID) Reading
SL-3	0 to 5 feet	At Background
	10 to 15 feet	At Background
	20 to 25 feet	At Background
	30 to 35 feet	At Background
	35 to 40 feet	At Background
	50 to 55 feet	At Background
	60 to 65 feet	At Background
	80 to 85 feet	At Background
	90 to 95 feet	At Background
	110 to 115 feet	At Background
	120 to 125 feet	At Background
	Core;124 to 129	At Background
	Core;129 to 134	At Background
	Core;134 to 138.5	At Background
	Core;138.5 to 139.5	At Background
	Waste Bin	At Background

Note: Background readings mean that the measurement did not change from ambient air readings.

Investigation Derived Waste Summary  
 South Landfill RI/FS, Part I Field Investigation--May/June, 1995

Well Location	Sample Depth	HNu (PID) Reading	Well Location	Sample Depth	HNu (PID) Reading
SL-4	0 to 5 feet	At background	SL-5	0 to 5 feet	At background
	10 to 15 feet	At background		10 to 15 feet	At background
	20 to 25 feet	At background		20 to 25 feet	No cuttings screened
	30 to 35 feet	At background		30 to 35 feet	At background
	40 to 45 feet	At background		40 to 45 feet	0.2
	50 to 55 feet	At background		50 to 55 feet	0.2
	60 to 65 feet	At background		60 to 65 feet	At background
	70 to 75 feet	At background		70 to 75 feet	At background
	80 to 85 feet	At background		80 to 85 feet	At background
	90 to 95 feet	At background		90 to 95 feet	At background
	100 to 105 feet	At background		110 to 115 feet	At background
	110 to 115 feet	At background		120 to	In-situ samples
	120 to 125 feet	At background		140 feet	collected
	Core;126.5-129.0	At background		Core;120-121	At background
	Core;129-134	At background		Core;121-124.5	At background
	Core;134-139	At background		Core;124.5-129.5	At background
	Core;139-140	At background		Core;135-140	At background
	Waste Bin	At background		Core;140-141	At background
				140 to	No cuttings samples
				180 feet	collected at surface
				Waste Bin	At background

Notes: HNu readings not "At background" are the needle deflection over background in parts per million (ppm)  
 Background readings mean that the measurement did not change from ambient air readings

# ATTACHMENT E

Physical Properties Analytical Results

Sample ID	Specific Gravity	Soil Moisture	Bulk Density (lb/ft3)
SL-1-55	2.80	12.08	6.62
SL-1-125	2.70	12.83	7.61
SL-2-20	2.90	26.47	5.61
SL-2-125	2.74	15.01	7.43
SL-2-134	2.71	13.85	7.75
SL-3-119	2.63	15.70	6.76
SL-3-124	2.61	11.18	7.79
SL-3-133	2.64	13.72	7.47
SL-3-139	2.62	10.43	7.69
SL-4d-65	2.63	11.32	6.50
SL-4d-95	2.80	14.36	6.78
SL-4d-105	2.59	6.04	6.41
SL-4d-125	2.59	12.78	7.89
SL-5s-30	2.68	13.96	6.70
SL-5s-105	2.64	4.28	5.97
SL-5d-75	2.68	15.35	6.40
SL-5d-120	2.63	12.51	7.64
SL-5d-140	2.65	13.31	8.48
SL-5d-180	2.64	9.91	7.27



# SERVI-TECH LABORATORIES

P.O. Box 169

1602 Park West Drive

Hastings, Nebraska 68902-0169

Phone: (402) 463-3522

FAX: (402) 463-8132

## LABORATORY ANALYSIS REPORT

SENT TO:	MORRISON - KNUDSON
11322	
	STE 300
	ENGLEWOOD, CO 80111

LAB NO.:	41238-41240
INVOICE NO.:	
DATE RECEIVED:	05/15/95
DATE REPORTED:	09/07/95

### RESULTS FOR

### ANALYSIS DESCRIPTION

### SAMPLE IDENTIFICATION

SOIL GRAIN SIZE (mm)	41238 SL-3-133	41239 SL-4d-65	41240 SL-4d-95
	-----% of Total-----		
>6.300	0.00	0.00	0.11
2.000-6.299	9.46	0.05	0.02
0.850-1.999	9.89	0.00	0.22
0.425-0.849	16.32	0.19	0.65
0.300-0.424	15.15	1.03	0.11
0.212-0.299	16.75	2.43	2.04
0.150-0.211	12.39	6.09	6.12
0.075-0.149	19.17	70.48	69.93
<0.075	0.91	19.75	20.84
PERCENT RECOVERY	100.05	100.02	100.05



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Hastings, Nebraska 68902-0169

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FAX: (402) 463-8132

## LABORATORY ANALYSIS REPORT

SENT TO:	MORRISON - KNUDSON
11322	
	STE 300
	ENGLEWOOD, CO 80111

LAB NO.:	41235-41237
INVOICE NO.:	N621628
DATE RECEIVED:	05/15/95
DATE REPORTED:	09/07/95

### RESULTS FOR

### ANALYSIS DESCRIPTION

### SAMPLE IDENTIFICATION

SOIL GRAIN SIZE (mm)	41235 SL-3-119	41236 SL-3-139	41237 SL-3-124
	-----% of Total-----		
>6.300	23.66	18.94	1.52
2.000-6.299	0.24	19.89	29.25
0.850-1.999	5.13	18.62	26.61
0.425-0.849	29.21	18.64	25.66
0.300-0.424	19.43	9.14	9.57
0.212-0.299	13.97	7.37	4.63
0.150-0.211	5.61	4.14	1.60
0.075-0.149	2.72	3.27	1.11
<0.075	0.03	0.00	0.05
PERCENT RECOVERY	100.01	100.01	100.00

*Byron H. Hester*





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Hastings, Nebraska 68902-0169

Phone: (402) 463-3522

FAX: (402) 463-8132

## LABORATORY ANALYSIS REPORT

SENT TO:	MORRISON - KNUDSON
11322	
	STE 300
	ENGLEWOOD, CO 80111

LAB NO.:	41241-41242
INVOICE NO.:	
DATE RECEIVED:	05/15/95
DATE REPORTED:	09/07/95

### RESULTS FOR

### ANALYSIS DESCRIPTION

### SAMPLE IDENTIFICATION

SOIL GRAIN SIZE (mm)	41241 SL-4d-105	41242 SL-4d-125
	-----% of Total-----	
>6.300	0.86	0.00
2.000-6.299	1.86	6.73
0.850-1.999	2.64	13.12
0.425-0.849	12.25	28.03
0.300-0.424	20.56	19.60
0.212-0.299	34.99	15.73
0.150-0.211	15.66	9.11
0.075-0.149	11.08	7.66
<0.075	0.07	0.04
PERCENT RECOVERY	99.97	100.02



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## LABORATORY ANALYSIS REPORT

SENT TO:	MORRISON - KNUDSON
11322	
	STE 300
	ENGLEWOOD, CO 80111

LAB NO.:	41069-41071
INVOICE NO.:	N621628
DATE RECEIVED:	05/15/95
DATE REPORTED:	09/07/95

RESULTS FOR
ANALYSIS DESCRIPTION
SAMPLE IDENTIFICATION

SOIL GRAIN SIZE (mm)	41069 SL-5d-180	41070 SL-5s-30	41071 SL-5s-105
	----- % of Total -----		
>6.300	0.00	6.71	0.00
2.000-6.299	37.59	0.01	15.10
0.850-1.999	23.84	0.04	10.67
0.425-0.849	22.50	1.60	10.96
0.300-0.424	8.47	3.98	10.36
0.212-0.299	3.91	19.40	19.08
0.150-0.211	1.92	27.29	17.45
0.075-0.149	1.78	37.87	16.03
<0.075	0.02	3.13	0.38
PERCENT RECOVERY	100.04	100.03	100.03

*Byron Hopkins*



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Hastings, Nebraska 68902-0169

Phone: (402) 463-3522

FAX: (402) 463-8132

## LABORATORY ANALYSIS REPORT

SENT TO:	MORRISON - KNUDSON
11322	
	STE 300
	ENGLEWOOD, CO 80111

LAB NO.:	41066-41068
INVOICE NO.:	N621628
DATE RECEIVED:	05/15/95
DATE REPORTED:	09/07/95

### RESULTS FOR

### ANALYSIS DESCRIPTION

### SAMPLE IDENTIFICATION

SOIL GRAIN SIZE (mm)	41066 SL-5d-75	41067 SL-5d-120	41068 SL-5d-140
	-----% of Total-----		
>6.300	2.89	3.15	16.91
2.000-6.299	0.02	8.94	9.85
0.850-1.999	0.76	10.44	13.31
0.425-0.849	3.32	21.73	22.98
0.300-0.424	4.56	17.60	18.42
0.212-0.299	10.03	17.32	11.95
0.150-0.211	13.14	10.45	4.75
0.075-0.149	51.26	9.99	1.81
<0.075	13.97	0.41	0.04
PERCENT RECOVERY	99.95	100.03	100.01

*Byron Hopkins*



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Hastings, Nebraska 68902-0169

Phone: (402) 463-3522

FAX: (402) 463-8132

## LABORATORY ANALYSIS REPORT

SENT TO:	MORRISON - KNUDSON
11322	
	STE 300
	ENGLEWOOD, CO 80111

LAB NO.:	40933-40937
INVOICE NO.:	N621628
DATE RECEIVED:	05/15/95
DATE REPORTED:	09/07/95

### RESULTS FOR

### ANALYSIS DESCRIPTION

### SAMPLE IDENTIFICATION

SOIL GRAIN SIZE (mm)	40933 SL1-55-S	40934 SL1-125-S	40935 SL2-20-S	40936 SL2-125-S	40937 SL2-134-S
	----- % of Total -----				
>6.300	2.99	0.00	0.00	0.56	0.00
2.000-6.299	0.00	14.97	0.00	2.53	5.89
0.850-1.999	1.49	20.01	11.27	6.94	5.06
0.425-0.849	5.36	36.37	9.86	33.73	20.62
0.300-0.424	6.76	13.94	7.04	30.19	21.29
0.212-0.299	12.60	9.79	2.82	20.32	22.46
0.150-0.211	14.38	3.47	1.41	4.88	14.48
0.075-0.149	45.14	1.40	42.25	0.80	9.81
<0.075	11.27	0.06	25.36	0.03	0.37
PERCENT RECOVERY	99.99	100.00	100.01	99.99	99.98

*Byron Apple's*



# SERVI-TECH LABORATORIES

1602 PARK WEST DRIVE • P. O. BOX 169 • HASTINGS, NE 68901

LAB: 402/463-3522

FAX: 402/463-8132

## Hydrometer analysis - Sedimentation data

Sample	40933	Temp. deg C	21
Specific Gravity	2.80	Temp. Coef. K	0.01291
Deflocculant	Sodium Hexametaphosphate	% <10 Mesh	99.99318
Defloc. Corr.	4		
Meniscus corr.	-1		

### Texture by Hydrometer reading

Elapsed Time (min)	Hydrometer Reading		%	Effective	Grain	
	Original	Corrected				Total
		"R"	100Ra/W	Sample	L	(mm)
0						
0.5	23	19	36.85748	36.85748	12.5	0.06459
1	20	16	31.03788	31.03788	13	0.046577
2	17	13	25.21828	25.21828	13.5	0.033562
5	15	11	21.33854	21.33854	13.8	0.021461
15	14	10	19.39868	19.39868	14	0.01248
30	14	10	19.39868	19.39868	14	0.008825
60	14	10	19.39868	19.39868	14	0.00624
120	14	10	19.39868	19.39868	14	0.004412
250	13	9	17.45881	17.45881	14	0.003057
1440	12	8	15.51894	15.51894	14.3	0.001287

BH



# SERVI-TECH LABORATORIES

1602 PARK WEST DRIVE • P. O. BOX 169 • HASTINGS, NE 68901

LAB: 402/463-3522

FAX: 402/463-8132

## Hydrometer analysis - Sedimentation data

Sample	40934			Temp. deg C	21
Specific Gravity	2.70			Temp. Coef. K	0.01291
Deflocculant	Sodium Hexametaphosphate			% <10 Mesh	85.0325
Defloc. Corr.	4				
Meniscus corr.	-1				
Texture by Hydrometer reading					
Elapsed Time (min)	Hydrometer Reading Original	Hydrometer Reading Corrected "R"	% Total 100Ra/W Sample	Effective Depth L	Grain Diameter (mm)
0					
0.5	6	2	3.299261 3.299261	12.5	0.06459
1	6	2	3.299261 3.299261	13	0.046577
2	6	2	3.299261 3.299261	13.5	0.033562
5	6	2	3.299261 3.299261	13.8	0.021461
15	6	2	3.299261 3.299261	14	0.01248
30	6	2	3.299261 3.299261	14	0.008825
60	6	2	3.299261 3.299261	14	0.00624
120	6	2	3.299261 3.299261	14	0.004412
250	7	3	4.948891 4.948891	14	0.003057
1440	7	3	4.948891 4.948891	14.3	0.001287

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1602 PARK WEST DRIVE • P. O. BOX 169 • HASTINGS, NE 68901

LAB: 402/463-3522

FAX: 402/463-8132

## Hydrometer analysis - Sedimentation data

Sample	40935						
Specific Gravity	2.90					Temp. deg C	21
Deflocculant	Sodium Hexametaphosphate					Temp. Coef. K	0.01291
Defloc. Corr.	4					% <10 Mesh	100
Meniscus corr.	-1						
Texture by Hydrometer reading							
Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	% Total 100Ra/W	% Sample	Effective Depth L	Grain Diameter (mm)	
0							
0.5	51	47	91.18	91.18	12.5	0.06459	
1	47	43	83.42	83.42	13	0.046577	
2	41	37	71.78	71.78	13.5	0.033562	
5	31	27	52.38	52.38	13.8	0.021461	
15	25	21	40.74	40.74	14	0.01248	
30	23	19	36.86	36.86	14	0.008825	
60	21	17	32.98	32.98	14	0.00624	
120	21	17	32.98	32.98	14	0.004412	
250	20	16	31.04	31.04	14	0.003057	
1440	16	12	23.28	23.28	14.3	0.001287	

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1602 PARK WEST DRIVE • P. O. BOX 169 • HASTINGS, NE 68901

LAB: 402/463-3522

FAX: 402/463-8132

## Hydrometer analysis - Sedimentation data

Sample	40936			
Specific Gravity	2.74		Temp. deg C	20
Deflocculant	Sodium Hexametaphosphate		Temp. Coef. K	0.01291
Defloc. Corr.	4		% <10 Mesh	97.44407
Meniscus corr.	-1			

### Texture by Hydrometer reading

Elapsed Time (min)	Hydrometer Original	Hydrometer Corrected "R"	% Total 100Ra/W	% Sample	Effective Depth L	Grain Diameter (mm)
0						
0.5	6	2	3.78083	3.78083	12.5	0.06459
1	6	2	3.78083	3.78083	13	0.046577
2	6	2	3.78083	3.78083	13.5	0.033562
5	6	2	3.78083	3.78083	13.8	0.021461
15	6	2	3.78083	3.78083	14	0.01248
30	6	2	3.78083	3.78083	14	0.008825
60	6	2	3.78083	3.78083	14	0.00624
120	6	2	3.78083	3.78083	14	0.004412
250	6	2	3.78083	3.78083	14	0.003057
1440	6	2	3.78083	3.78083	14.3	0.001287

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LAB: 402/463-3522

FAX: 402/463-8132

## Hydrometer analysis - Sedimentation data

Sample	40937			
Specific Gravity	2.71		Temp. deg C	20
Deflocculant	Sodium Hexametaphosphate		Temp. Coef. K	0.01291
Defloc. Corr.	4		% <10 Mesh	94.09037
Meniscus corr.	-1			

### Texture by Hydrometer reading

Elapsed Time (min)	Hydrometer Reading		100Ra/W	% Total Sample	Effective Depth L	Grain Diameter (mm)
	Original	Corrected "R"				
0						
0.5	14	10	18.25353	18.25353	12.5	0.06459
1	13	9	16.42818	16.42818	13	0.046577
2	13	9	16.42818	16.42818	13.5	0.033562
5	13	9	16.42818	16.42818	13.8	0.021461
15	12	8	14.60283	14.60283	14	0.01248
30	12	8	14.60283	14.60283	14	0.008825
60	12	8	14.60283	14.60283	14	0.00624
120	12	8	14.60283	14.60283	14	0.004412
250	12	8	14.60283	14.60283	14	0.003057
1440	10	6	10.95212	10.95212	14.3	0.001287

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# SERVI-TECH LABORATORIES

1602 PARK WEST DRIVE • P. O. BOX 169 • HASTINGS, NE 68901

LAB: 402/463-3522

FAX: 402/463-8132

## Hydrometer analysis - Sedimentation data

Sample	41066						
Specific Gravity	2.68				Temp. deg C	22	
Deflocculant	Sodium Hexametaphosphate				Temp. Coef. K	0.01291	
Defloc. Corr.	4				% <10 Mesh	99.93064	
Meniscus corr.	-1						
Texture by Hydrometer reading							
Elapsed Time (min)	Hydrometer Original	Reading Corrected "R"	% 100Ra/W	% Total Sample	Effective Depth L	Grain Diameter (mm)	
0							
0.5	37	33	63.9756	63.9756	12.5	0.06459	
1	31	27	52.34367	52.34367	13	0.046577	
2	26	22	42.6504	42.6504	13.5	0.033562	
5	23	19	36.83443	36.83443	13.8	0.021461	
15	19	15	29.07982	29.07982	14	0.01248	
30	17	13	25.20251	25.20251	14	0.008825	
60	17	13	25.20251	25.20251	14	0.00624	
120	16	12	23.26385	23.26385	14	0.004412	
250	16	12	23.26385	23.26385	14	0.003057	
1440	14	10	19.38654	19.38654	14.3	0.001287	

BH



# SERVI-TECH LABORATORIES

1602 PARK WEST DRIVE • P. O. BOX 169 • HASTINGS, NE 68901

LAB: 402/463-3522

FAX: 402/463-8132

## Hydrometer analysis - Sedimentation data

Sample	41067	Temp. deg C	22
Specific Gravity	2.63	Temp. Coef. K	0.01291
Deflocculant	Sodium Hexametaphosphate	% <10 Mesh	90.79504
Defloc. Corr.	4		
Meniscus corr.	-1		

### Texture by Hydrometer reading

Elapsed Time (min)	Hydrometer Original Reading	Corrected "R"	100Ra/W	% Total Sample	Effective Depth L	Grain Diameter (mm)
0						
0.5	9	5	8.807119	8.807119	12.5	0.06459
1	7	3	5.284271	5.284271	13	0.046577
2	7	3	5.284271	5.284271	13.5	0.033562
5	7	3	5.284271	5.284271	13.8	0.021461
15	7	3	5.284271	5.284271	14	0.01248
30	7	3	5.284271	5.284271	14	0.008825
60	7	3	5.284271	5.284271	14	0.00624
120	7	3	5.284271	5.284271	14	0.004412
250	7	3	5.284271	5.284271	14	0.003057
1440	7	3	5.284271	5.284271	14.3	0.001287

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## Hydrometer analysis - Sedimentation data

Sample	41068			Temp. deg C	22
Specific Gravity	2.65			Temp. Coef. K	0.01291
Deflocculant	Sodium Hexametaphosphate			% <10 Mesh	88.15997
Defloc. Corr.	4				
Meniscus corr.	-1				
Texture by Hydrometer reading					
Elapsed Time (min)	Hydrometer Original Reading	Hydrometer Corrected "R"	% Total 100Ra/W Sample	Effective Depth L	Grain Diameter (mm)
0					
0.5	7	3	5.130911 5.130911	12.5	0.06459
1	6	2	3.420607 3.420607	13	0.046577
2	6	2	3.420607 3.420607	13.5	0.033562
5	6	2	3.420607 3.420607	13.8	0.021461
15	6	2	3.420607 3.420607	14	0.01248
30	6	2	3.420607 3.420607	14	0.008825
60	6	2	3.420607 3.420607	14	0.00624
120	6	2	3.420607 3.420607	14	0.004412
250	6	2	3.420607 3.420607	14	0.003057
1440	6	2	3.420607 3.420607	14.3	0.001287

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## Hydrometer analysis - Sedimentation data

Sample	41069			Temp. deg C	22
Specific Gravity	2.64			Temp. Coef. K	0.01291
Deflocculant	Sodium Hexametaphosphate			% <10 Mesh	62.44257
Defloc. Corr.	4				
Meniscus corr.	-1				
Texture by Hydrometer reading					
Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	% Total 100Ra/W Sample	Effective Depth L	Grain Diameter (mm)
0					
0.5	7	3	3.634158 3.634158	12.5	0.06459
1	7	3	3.634158 3.634158	13	0.046577
2	7	3	3.634158 3.634158	13.5	0.033562
5	7	3	3.634158 3.634158	13.8	0.021461
15	7	3	3.634158 3.634158	14	0.01248
30	7	3	3.634158 3.634158	14	0.008825
60	7	3	3.634158 3.634158	14	0.00624
120	7	3	3.634158 3.634158	14	0.004412
250	7	3	3.634158 3.634158	14	0.003057
1440	6	2	2.422772 2.422772	14.3	0.001287

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LAB: 402/463-3522

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## Hydrometer analysis - Sedimentation data

Sample	41070						
Specific Gravity	2.68					Temp. deg C	22
Deflocculant	Sodium Hexametaphosphate					Temp. Coef. K	0.01291
Defloc. Corr.	4					% <10 Mesh	100.0257
Meniscus corr.	-1						
Texture by Hydrometer reading							
Elapsed Time (min)	Hydrometer Reading Original	Hydrometer Reading Corrected "R"	100Ra/W	% Total Sample	Effective Depth L	Grain Diameter (mm)	
0							
0.5	27	23	44.63148	44.63148	12.5	0.06459	
1	24	20	38.80998	38.80998	13	0.046577	
2	41	37	71.79847	71.79847	13.5	0.033562	
5	18	14	27.16699	27.16699	13.8	0.021461	
15	16	12	23.28599	23.28599	14	0.01248	
30	15	11	21.34549	21.34549	14	0.008825	
60	15	11	21.34549	21.34549	14	0.00624	
120	15	11	21.34549	21.34549	14	0.004412	
250	14	10	19.40499	19.40499	14	0.003057	
1440	13	9	17.46449	17.46449	14.3	0.001287	

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## Hydrometer analysis - Sedimentation data

Sample	41071			Temp. deg C	21
Specific Gravity	2.64			Temp. Coef. K	0.01291
Deflocculant	Sodium Hexametaphosphate			% <10 Mesh	84.92826
Defloc. Corr.	4				
Meniscus corr.	-1				
Texture by Hydrometer reading					
Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	% Total 100Ra/W Sample	Effective Depth L	Grain Diameter (mm)
0					
0.5	13	9	14.82847 14.82847	12.5	0.06459
1	12	8	13.18087 13.18087	13	0.046577
2	12	8	13.18087 13.18087	13.5	0.033562
5	11	7	11.53326 11.53326	13.8	0.021461
15	11	7	11.53326 11.53326	14	0.01248
30	11	7	11.53326 11.53326	14	0.008825
60	11	7	11.53326 11.53326	14	0.00624
120	10	6	9.885649 9.885649	14	0.004412
250	10	6	9.885649 9.885649	14	0.003057
1440	9	5	8.238041 8.238041	14.3	0.001287

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## Hydrometer analysis - Sedimentation data

Sample	41235			Temp. deg C	21
Specific Gravity	2.63			Temp. Coef. K	0.01291
Deflocculant	Sodium Hexametaphosphate			% <10 Mesh	99.69345
Defloc. Corr.	4				
Meniscus corr.	-1				
Texture by Hydrometer reading					
Elapsed Time (min)	Hydrometer Original Reading	Corrected "R"	% Total 100Ra/W Sample	Effective Depth L	Grain Diameter (mm)
0					
0.5	6	2	3.868106 3.868106	12.5	0.06459
1	5	1	1.934053 1.934053	13	0.046577
2	5	1	1.934053 1.934053	13.5	0.033562
5	5	1	1.934053 1.934053	13.8	0.021461
15	5	1	1.934053 1.934053	14	0.01248
30	5	1	1.934053 1.934053	14	0.008825
60	6	2	3.868106 3.868106	14	0.00624
120	6	2	3.868106 3.868106	14	0.004412
250	6	2	3.868106 3.868106	14	0.003057
1440	6	2	3.868106 3.868106	14.3	0.001287

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LAB: 402/463-3522

FAX: 402/463-8132

## Hydrometer analysis - Sedimentation data

Sample	41236			Temp. deg C	21
Specific Gravity	2.62			Temp. Coef. K	0.01291
Deflocculant	Sodium Hexametaphosphate			% <10 Mesh	75.47451
Defloc. Corr.	4				
Meniscus corr.	-1				
Texture by Hydrometer reading					
Elapsed Time (min)	Hydrometer Original Reading	Corrected "R"	% Total 100Ra/W Sample	Effective Depth L	Grain Diameter (mm)
0					
0.5	11	7	10.24944 10.24944	12.5	0.06459
1	9	5	7.321027 7.321027	13	0.046577
2	9	5	7.321027 7.321027	13.5	0.033562
5	8	4	5.856822 5.856822	13.8	0.021461
15	8	4	5.856822 5.856822	14	0.01248
30	8	4	5.856822 5.856822	14	0.008825
60	9	5	7.321027 7.321027	14	0.00624
120	9	5	7.321027 7.321027	14	0.004412
250	9	5	7.321027 7.321027	14	0.003057
1440	8	4	5.856822 5.856822	14.3	0.001287

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LAB: 402/463-3522

FAX: 402/463-8132

## Hydrometer analysis - Sedimentation data

Sample	41237			Temp. deg C	21
Specific Gravity	2.61			Temp. Coef. K	0.01291
Deflocculant	Sodium Hexametaphosphate			% <10 Mesh	70.2954
Defloc. Corr.	4				
Meniscus corr.	-1				
Texture by Hydrometer reading					
Elapsed Time (min)	Hydrometer Reading Original	Hydrometer Reading Corrected "R"	% Total 100Ra/W Sample	Effective Depth L	Grain Diameter (mm)
0					
0.5	12	8	10.90985 10.90985	12.5	0.06459
1	7	3	4.091192 4.091192	13	0.046577
2	6	2	2.727462 2.727462	13.5	0.033562
5	6	2	2.727462 2.727462	13.8	0.021461
15	6	2	2.727462 2.727462	14	0.01248
30	6	2	2.727462 2.727462	14	0.008825
60	7	3	4.091192 4.091192	14	0.00624
120	7	3	4.091192 4.091192	14	0.004412
250	7	3	4.091192 4.091192	14	0.003057
1440	7	3	4.091192 4.091192	14.3	0.001287

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LAB: 402/463-3522

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## Hydrometer analysis - Sedimentation data

Sample	41238			Temp. deg C	21
Specific Gravity	2.64			Temp. Coef. K	0.01291
Deflocculant	Sodium Hexametaphosphate			% <10 Mesh	90.57294
Defloc. Corr.	4				
Meniscus corr.	-1				
Texture by Hydrometer reading					
Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	% Total 100Ra/W Sample	Effective Depth L	Grain Diameter (mm)
0					
0.5	13	9	15.81404 15.81404	12.5	0.06459
1	11	7	12.29981 12.29981	13	0.046577
2	10	6	10.54269 10.54269	13.5	0.033562
5	10	6	10.54269 10.54269	13.8	0.021461
15	9	5	8.785575 8.785575	14	0.01248
30	9	5	8.785575 8.785575	14	0.008825
60	10	6	10.54269 10.54269	14	0.00624
120	10	6	10.54269 10.54269	14	0.004412
250	10	6	10.54269 10.54269	14	0.003057
1440	8	4	7.02846 7.02846	14.3	0.001287

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LAB: 402/463-3522

FAX: 402/463-8132

## Hydrometer analysis - Sedimentation data

Sample	41239			Temp. deg C	21
Specific Gravity	2.63			Temp. Coef. K	0.01291
Deflocculant	Sodium Hexametaphosphate			% <10 Mesh	99.95364
Defloc. Corr.	4				
Meniscus corr.	-1				
Texture by Hydrometer reading					
Elapsed Time (min)	Hydrometer Reading Original	Hydrometer Reading Corrected "R"	% Total 100Ra/W Sample	Effective Depth L	Grain Diameter (mm)
0					
0.5	38	34	65.92942 65.92942	12.5	0.06459
1	31	27	52.35572 52.35572	13	0.046577
2	28	24	46.53842 46.53842	13.5	0.033562
5	23	19	36.84291 36.84291	13.8	0.021461
15	20	16	31.02561 31.02561	14	0.01248
30	21	17	32.96471 32.96471	14	0.008825
60	20	16	31.02561 31.02561	14	0.00624
120	19	15	29.08651 29.08651	14	0.004412
250	18	14	27.14741 27.14741	14	0.003057
1440	12	8	15.51281 15.51281	14.3	0.001287

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## Hydrometer analysis - Sedimentation data

Sample	41240						
Specific Gravity	2.80					Temp. deg C	22
Deflocculant	Sodium Hexametaphosphate					Temp. Coef. K	0.01291
Defloc. Corr.	4					% <10 Mesh	100.0124
Meniscus corr.	-1						
Texture by Hydrometer reading							
Elapsed Time (min)	Hydrometer Reading Original	Hydrometer Reading Corrected "R"	100Ra/W	% Total Sample	Effective Depth L	Grain Diameter (mm)	
0							
0.5	40	36	69.84865	69.84865	12.5	0.06459	
1	32	28	54.32672	54.32672	13	0.046577	
2	25	21	40.74504	40.74504	13.5	0.033562	
5	20	16	31.04384	31.04384	13.8	0.021461	
15	17	13	25.22312	25.22312	14	0.01248	
30	17	13	25.22312	25.22312	14	0.008825	
60	16	12	23.28288	23.28288	14	0.00624	
120	12	8	15.52192	15.52192	14	0.004412	
250	16	12	23.28288	23.28288	14	0.003057	
1440	14	10	19.4024	19.4024	14.3	0.001287	

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## Hydrometer analysis - Sedimentation data

Sample	41241			
Specific Gravity	2.59		Temp. deg C	22
Deflocculant	Sodium Hexametaphosphate		Temp. Coef. K	0.01291
Defloc. Corr.	4		% <10 Mesh	98.10435
Meniscus corr.	-1			

### Texture by Hydrometer reading

Elapsed Time (min)	Hydrometer Original Reading	Hydrometer Corrected "R"	% Total 100Ra/W Sample	Effective Depth L	Grain Diameter (mm)
0					
0.5	13	9	17.12902	17.12902	12.5 0.06459
1	11	7	13.32257	13.32257	13 0.046577
2	11	7	13.32257	13.32257	13.5 0.033562
5	11	7	13.32257	13.32257	13.8 0.021461
15	11	7	13.32257	13.32257	14 0.01248
30	11	7	13.32257	13.32257	14 0.008825
60	11	7	13.32257	13.32257	14 0.00624
120	11	7	13.32257	13.32257	14 0.004412
250	11	7	13.32257	13.32257	14 0.003057
1440	10	6	11.41935	11.41935	14.3 0.001287

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## Hydrometer analysis - Sedimentation data

Sample	41242		
Specific Gravity	2.59	Temp. deg C	22
Deflocculant	Sodium Hexametaphosphate	Temp. Coef. K	0.01291
Defloc. Corr.	4	% <10 Mesh	93.28065
Meniscus corr.	-1		

### Texture by Hydrometer reading

Elapsed Time (min)	Hydrometer Reading Original	Hydrometer Reading Corrected "R"	100Ra/W	% Total Sample	Effective Depth L	Grain Diameter (mm)
0						
0.5	6	2	3.619289	3.619289	12.5	0.06459
1	6	2	3.619289	3.619289	13	0.046577
2	5	1	1.809645	1.809645	13.5	0.033562
5	5	1	1.809645	1.809645	13.8	0.021461
15	5	1	1.809645	1.809645	14	0.01248
30	5	1	1.809645	1.809645	14	0.008825
60	6	2	3.619289	3.619289	14	0.00624
120	6	2	3.619289	3.619289	14	0.004412
250	6	2	3.619289	3.619289	14	0.003057
1440	6	2	3.619289	3.619289	14.3	0.001287

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