AMENDMENT A TO ADDENDUM 8 OF THE REMEDIAL INVESTIGATION WORK PLAN

Water Supply Well Evaluation and Monitoring Well Installation

Smurfit-Stone/Frenchtown Mill Site Missoula County, Montana

Prepared for:

WestRock CP, LLC P.O. Box 4098 Norcross, GA 30097

International Paper Company 6400 Poplar Avenue Memphis, TN 38197

Prepared by: NewFields Companies, LLC 700 SW Higgins Avenue, Suite 15 Missoula, MT 59803



Version 2 June 14, 2019

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Version 2 Issued: June 14, 2019

David Tooke Project Coordinator NewFields Date

Allie Archer Remedial Project Manager U.S. Environmental Protection Agency Region 8 Date



TABLE OF CONTENTS

1.0	INTRODUCTION	1
2.0	DATA QUALITY OBJECTIVES	2
3.0	SCOPE OF WORK	3
3.1	SITEWIDE WATER SUPPLY WELL EVALUATION	3
3.	1.1 Water Supply Well Reconnaissance	3
3.2	HP2 MONITORING WELL INSTALLATION AND DEVELOPMENT	4
3.3	FIELD DOCUMENTATION AND SAMPLE HANDLING	
3.4	GROUNDWATER QUALITY SAMPLING	
3.5	DECONTAMINATION PROCEDURES	
3.6	INVESTIGATION-DERIVED WASTE (IDW)	5
3.7	REPORTING	5
4.0	HEALTH AND SAFETY	6
5.0	SCHEDULE	7
6.0	REFERENCES	8

LIST OF FIGURES

Figure 1:	Site Location Map
Figure 2:	Site Map
Figure 3:	Existing and Proposed Monitoring Wells
Figure 4:	Water Supply Wells

LIST OF TABLES

- Table 1: Data Quality Objectives
- Table 2: Water Supply Well Summary



LIST OF APPENDICES

Appendix A – Figures

Appendix B – Tables

Appendix C – Water Supply Well Logs

Appendix D – Standard Operating Procedures

Appendix E – Field Forms and Chain-of-Custody Forms



1.0 INTRODUCTION

This Remedial Investigation Work Plan (RIWP) Amendment to Addendum 8 describes additional data collection for 2019 at the Smurfit-Stone/Frenchtown Mill (hereafter referenced as the "Site"; **Figures 1** and **2**). The Work Plan is Amendment A to Addendum No. 8 of the RIWP (NewFields, 2015a), and was prepared consistent with the RIWP. This Amendment was prepared in accordance with Section 46 of the Administrative Settlement Agreement and Order on Consent (AOC) for Remedial Investigation/Feasibility Study between the potentially responsible parties (PRPs; M2Green Redevelopment LLC, WestRock CP, LLC, International Paper Company) and the U.S. Environmental Protection Agency (EPA), filed November 12, 2015. Report figures are provided as **Appendix A**, and tables are included as **Appendix B**.

This amendment was prepared in response to formal requests from the Montana Department of Public Health and Human Services (DPHHS) and the EPA regarding additional data collection at the Site in 2019. DPHHS requested to the EPA that the PRPs conduct a Sitewide water supply evaluation in a letter dated November 8, 2018 (DPHHS, 2018). The Montana Department of Environmental Quality (DEQ) confirmed their support for a Sitewide water supply evaluation in a separate letter to the EPA dated November 19, 2018 (DEQ, 2018). The EPA requested via email on April 15, 2019, that the PRPs install two additional shallow monitoring wells along the Clark Fork River (CFR) berm adjacent to Holding Pond 2 (EPA, 2019a). Additionally, the EPA requested via email on April 17, 2019 (EPA, 2019b) and during subsequent conference calls, that the PRPs continue to monitor groundwater for volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs) at selected locations.



2.0 DATA QUALITY OBJECTIVES

Table 1 presents the Data Quality Objectives (DQOs) for the 2019 data collection at the Site. The EPA's Seven-Step Approach (EPA, 2006) was used to identify the DQOs. Based on the current conceptual site model of groundwater flow, discussions with EPA and DEQ, and previous groundwater quality data, additional data collection in 2019 will involve the following:

- Water supply wells will be inventoried, located, and sampled to address requests by DPHHS for the purpose of human health risk assessment;
- Two additional monitoring wells will be installed along the CFR berm adjacent to HP2 to evaluate potential spatial data gaps in metals and dioxins concentrations in shallow groundwater. These new wells will be added to the existing 2019 groundwater monitoring program; and

The additional data collection listed above will be incorporated into the 2019 groundwater monitoring events, as outlined in Addendum No. 8 to the RIWP (NewFields, 2018). The water supply well investigation, new monitoring well installation, and selected VOC/SVOC sampling will be completed during the June 2019 groundwater sampling event.



3.0 SCOPE OF WORK

The approach to supplemental data collection performed in 2019 is based on available groundwater data that were collected from 2014 to 2018 on and near the Site. COPCs in groundwater at the Site include dioxin/furans, metals, polychlorinated biphenyls (PCBs), volatile organic compounds (VOCs), and semi-volatile organic compounds (SVOCs). The primary objectives for the supplemental data collection proposed for 2019 include:

- Investigate the nature and extent of metals, dioxins/furans, SVOCs, and VOCs in shallow groundwater along the CFR berm near HP2 (Figure 3); and
- Assess potential water supply wells located on or near the Site (Figure 4) to assess a potential exposure pathway and to define metals and dioxins/furans concentrations in groundwater from water supply wells.

NewFields will employ the groundwater elevation monitoring and water quality sampling methods described in EPA-approved planning documents, including the Field Sampling Plan that is part of the RIWP (NewFields 2015b), and the Quality Assurance Project Plan (NewFields 2015c). NewFields will also protect its workers and site visitors in accordance with the EPA-approved Health and Safety Plan (NewFields 2015d). Standard Operating Procedures (SOPs) relevant to groundwater monitoring activities are included in previously-approved planning documents and in **Appendix C**.

3.1 SITEWIDE WATER SUPPLY WELL EVALUATION

The DPHHS requested an inventory of onsite water supply wells because there is not presently an accurate record of the number or location of potential supply wells on the Site. Many records related to historical water supply well installation, location, use, and construction are incomplete and/or unavailable. NewFields completed an inventory of all water supply wells known to exist on the Site, as well as four domestic wells located offsite to the north on Marcure Lane (Figure 2). Several data sources were cross referenced to assemble the water supply well inventory, including: well log records from the Montana Bureau of Mines and Geology (MBMG), water rights records from the Montana Department of Natural Resources and Conservation (DNRC), land ownership records from Missoula County's Property Information System, and operations records from the Mill. A summary of the water supply well inventory is included as Table 2, and well logs from MBMG are provided as Appendix D.

As many as 37 potential water supply wells may have existed on the property based on the records search (Figure 4). At least seven of the 37 wells were abandoned in the 1970s or 1980s. Of the 30 remaining wells which could potentially be present onsite, seven of those wells have recently been sampled for water quality by the PRPs and/or the EPA. The remainder of this proposed water supply well evaluation will focus on verifying and sampling a representative portion of the accessible and viable supply wells remaining onsite.

3.1.1 Water Supply Well Reconnaissance

Proposed field activities related to the water supply well evaluation are summarized in **Table 2**. NewFields will attempt to locate and sample three wells which have never successfully been located: Curtis Ranch



House Well, O'Conner House Well, and the Peterson Feedlot Well. Newfields will also attempt to sample the following water supply wells which have been previously located: Car Wash Well, Cartage Building Well, Hoffman Construction Well, Fairbanks Ranch House Well, Log Chipper Well, Original Peterson Dairy Farm Well, Timber Products Office Well, and the Wastewater Clarifier Well. The site structure northeast of SMW 4 will be checked for a well. Also, NewFields will verify whether anyone is drinking water from the Danforth and Gursky wells.

Upon successful location of the each respective well, NewFields will evaluate the wellhead and immediate vicinity for any health and safety related hazards. NewFields retains the judgement authority to stop work at any well location and deviate from the proposed sampling outlined in this work plan Amendment based on any health and safety related hazards.

Assuming successful completion of the well-specific health and safety evaluation, NewFields will measure the water level and total depth of the well in accordance with SOP 5 (**Appendix C**), and collect a water quality sample in accordance with SOP 12A or 12C (**Appendix C**). If an existing operable pump is present in the well, NewFields will attempt to sample the well using a three-volume purge (SOP 12C). If an operable pump is not present in the well, and the wellhead allows use of a portable sampling pump (bladder or peristaltic), then a low-flow groundwater water quality sample will be collected in accordance with SOP 12A.

Note that not all water supply wells are proposed for water level measurement and/or water quality sampling as their general location may be represented by an existing alternate location as follows:

- Deep Well #4A is not proposed for measurement or sampling, and will be represented by Deep Well #5A as these two wells are nearly identical in construction and are located approximately 400 feet apart;
- Water level and total depth measurements are proposed for the Danforth and Gursky wells, but water quality sampling is not proposed at these locations as they are completed in a similar interval to the existing shallow monitoring well network; and
- Deep Wells #11, #13, #14, #15, #16, #17, #20, and #21 are not proposed for measurement or sampling, and are represented by the existing data from Deep Well #12 as these wells are nearly identical in construction and located cross-gradient of the Industrial Area of the Site.

3.2 HP2 MONITORING WELL INSTALLATION AND DEVELOPMENT

The EPA requested via email on April 15, 2019, that the PRPs install two additional shallow monitoring wells along the Clark Fork River (CFR) berm adjacent to Holding Pond 2 (EPA, 2019). Newfields scientists performed a field reconnaissance of potential well installation locations on May 9, 2019. Proposed well locations (NFMW22 and NFMW23) from the field reconnaissance are shown on **Figure 3**. Locations were chosen based on the nearest drill rig access to the general locations suggested by the EPA.

Wells will be installed with a hollow-stem auger drill rig, consistent with other Site monitoring wells and SOP-15. Considering the height of the CFR berm, the well depth is anticipated to be approximately 35



feet, and 20-feet of factory slotted PVC well screen will be installed in each well. Following well installation, well development will be completed in accordance with SOP-17. Water quality sampling will occur a minimum of 24 hours after well development is completed.

3.3 FIELD DOCUMENTATION AND SAMPLE HANDLING

NewFields personnel will fully document all activities associated with the groundwater monitoring events in accordance with SOP-1. Field documentation and sample handling will be handled consistent with procedures described in Addendum 8 to the RIWP (NewFields, 2018). Field forms and laboratory Chain-of-Custody Forms are included as **Appendix E**.

3.4 GROUNDWATER QUALITY SAMPLING

Table 2 identifies the water supply wells to be sampled and associated COPCs that will be analyzed. Proposed monitoring wells NFMW22 and NFMW23 will be sampled for the following analytes: total/dissolved metals, dioxins/furans, semi-volatile organic compounds (SVOCs), volatile organic compounds (VOCs), nutrients, and common ions. Additional detail on the analytes and analytical methods is described in Addendum 8 to the RIWP (NewFields, 2018).

3.5 DECONTAMINATION PROCEDURES

All non-disposable field equipment used for groundwater sampling will be decontaminated in accordance with SOP-2 (**Appendix C**). All decontamination will be handled consistent with procedures described in Addendum 8 to the RIWP (NewFields, 2018).

3.6 INVESTIGATION-DERIVED WASTE (IDW)

Well development and purge water will be handled according to SOP-25. All IDW will be handled and managed consistent with procedures described in Addendum 8 to the RIWP (NewFields, 2018).

3.7 REPORTING

Additional data related to the water supply well investigation and the new proposed monitoring wells will be included in a groundwater monitoring report. The report will be consistent with previous reports as described in Addendum 8 to the RIWP (NewFields, 2018).



4.0 HEALTH AND SAFETY

NewFields staff involved in groundwater monitoring activities will complete work in accordance with the approved Health & Safety Plan (Appendix F of the RIWP; NewFields, 2015d). The HASP will be complemented by a Job Safety Analysis (JSA) worksheet to address safety concerns related to groundwater sampling and water level monitoring. At the beginning of each work day, field team leaders will conduct daily staff safety meetings guided by the HASP and JSA.

Based on previous Site knowledge, NewFields is aware of at least two well locations (Cartage Building Well and Hoffman Construction Well) which may be located in a confined space as defined in Title 29 of the Code of Federal Regulations (29 CFR § 1910.146). The potential confined spaces consist of large underground vaults containing meteoric water and electrical/plumbing utilities. If these wells are determined to be located in confined spaces, NewFields will attempt to sample the wells from outside of (above) the confined space. NewFields will not enter the confined space to measure water levels or collect water quality samples.



5.0 SCHEDULE

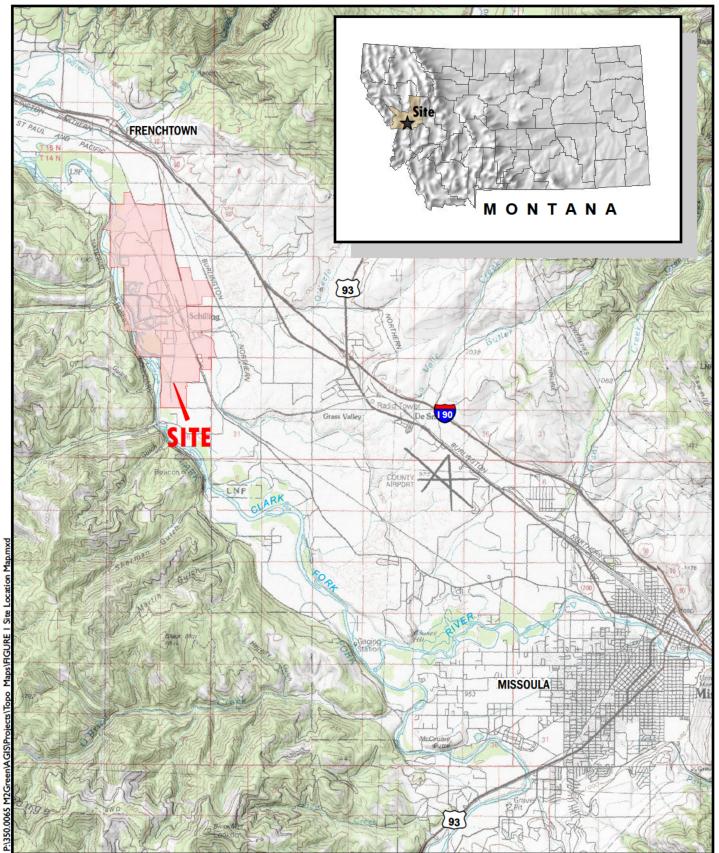
All monitoring and sampling activities will be implemented according to this plan once it has been approved by EPA and DEQ. The water supply well evaluation will be completed in conjunction with the June 2019 groundwater sampling event. Monitoring well installation at NFMW22 and NFMW23 is scheduled to occur in mid-June, and water quality samples from these wells will be collected towards the end of the June 2019 groundwater monitoring event. Water level measurement and water quality sampling at NFMW22 and NFMW23 will also occur during the December 2019 groundwater monitoring event.

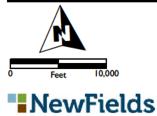


6.0 REFERENCES

- Environmental Protection Agency (EPA), 2006. Guidance on Systematic Planning Using the Data Quality Objectives Process. EPA QA/G-4. February 2006.
- **EPA, 2019a**. *Request for additional wells along HP2*. Email from Allie Archer to David Tooke, Keith Large, and Sara Edinberg. April 15, 2019.
- **EPA, 2019b**. *draft Agenda for Smurfit call tomorrow*. Email from Allie Archer to David Tooke and Keith Large. April 17, 2019.
- NewFields, 2015a. Remedial Investigation Work Plan, Smurfit-Stone/Frenchtown Mill, Missoula County, Montana. Prepared for International Paper Company, M2Green Redevelopment, LLC, and WestRock CP, LLC. November.
- NewFields 2015b. Field Sampling Plan for the Smurfit Stone/Frenchtown Mill Site, Missoula County, Montana. Version 2, 11/09/2015. Included as Appendix D of the Remedial Investigation Work Plan, November 2015.
- NewFields 2015c. Quality Assurance Project Plan for the Smurfit Stone/Frenchtown Mill Site, Missoula County, Montana. Version 2, 11/05/2015. Included as Appendix E of the Remedial Investigation Work Plan, November 2015.
- NewFields 2015d. Health and Safety Plan for the Smurfit Stone/Frenchtown Mill Site Remedial Investigation, Missoula County, Montana. Version 1.0, 11/10/2015. Included as Appendix F of the Remedial Investigation Work Plan, November 2015.
- NewFields 2018. Addendum 8 to the Remedial Investigation Work Plan: 2018 and 2019 Groundwater Monitoring - Smurfit Stone/Frenchtown Mill Site Remedial Investigation, Missoula County, Montana. Version 4.0, November 30.

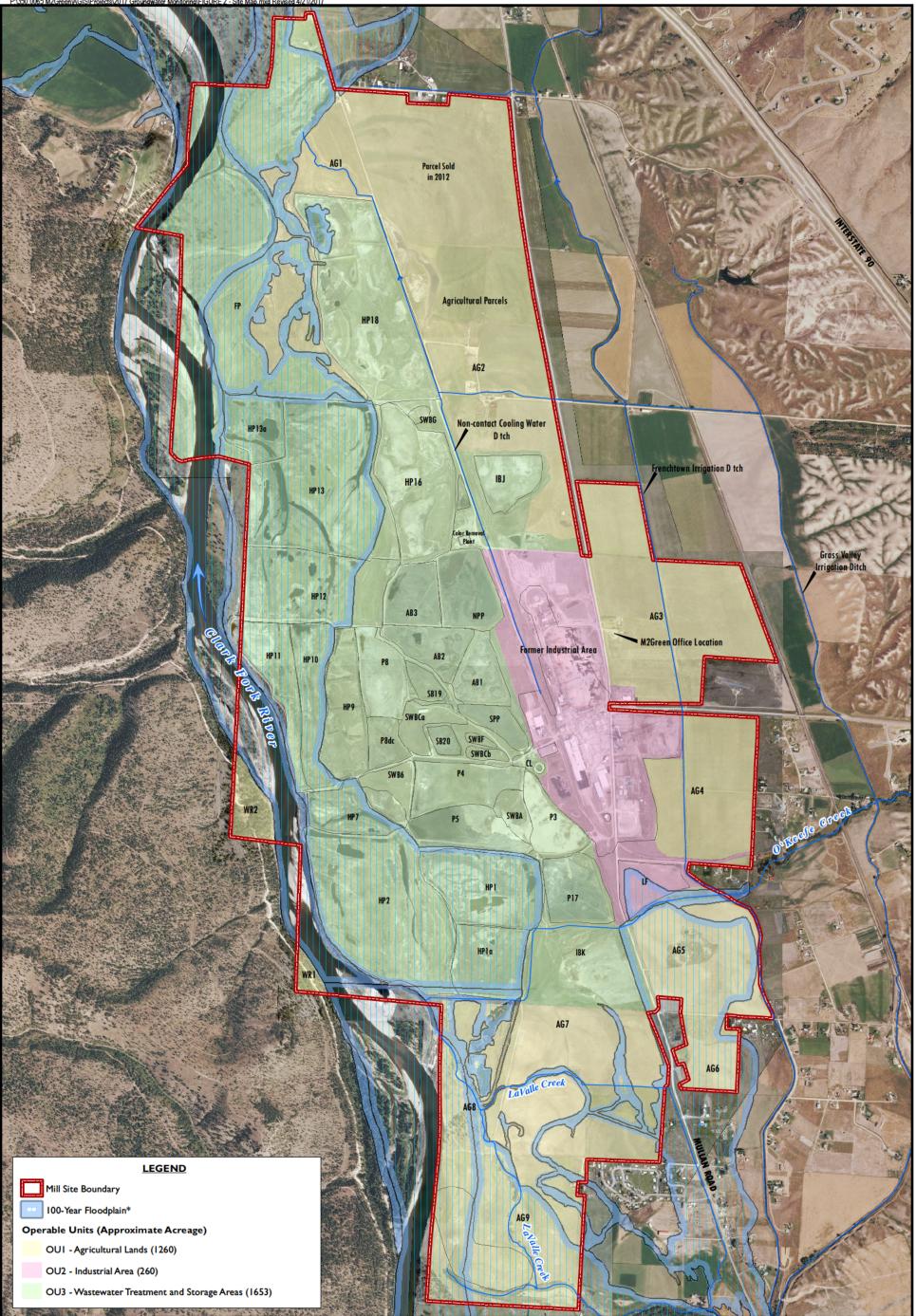


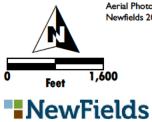




Source: Montana USGS 100K Topographic Map

Site Location Map Former Frenchtown Mill Site Missoula County, Montana FIGURE 1





Aerial Photo Source: NA P 2011 and Newfields 2016 (Within Site Boundary)

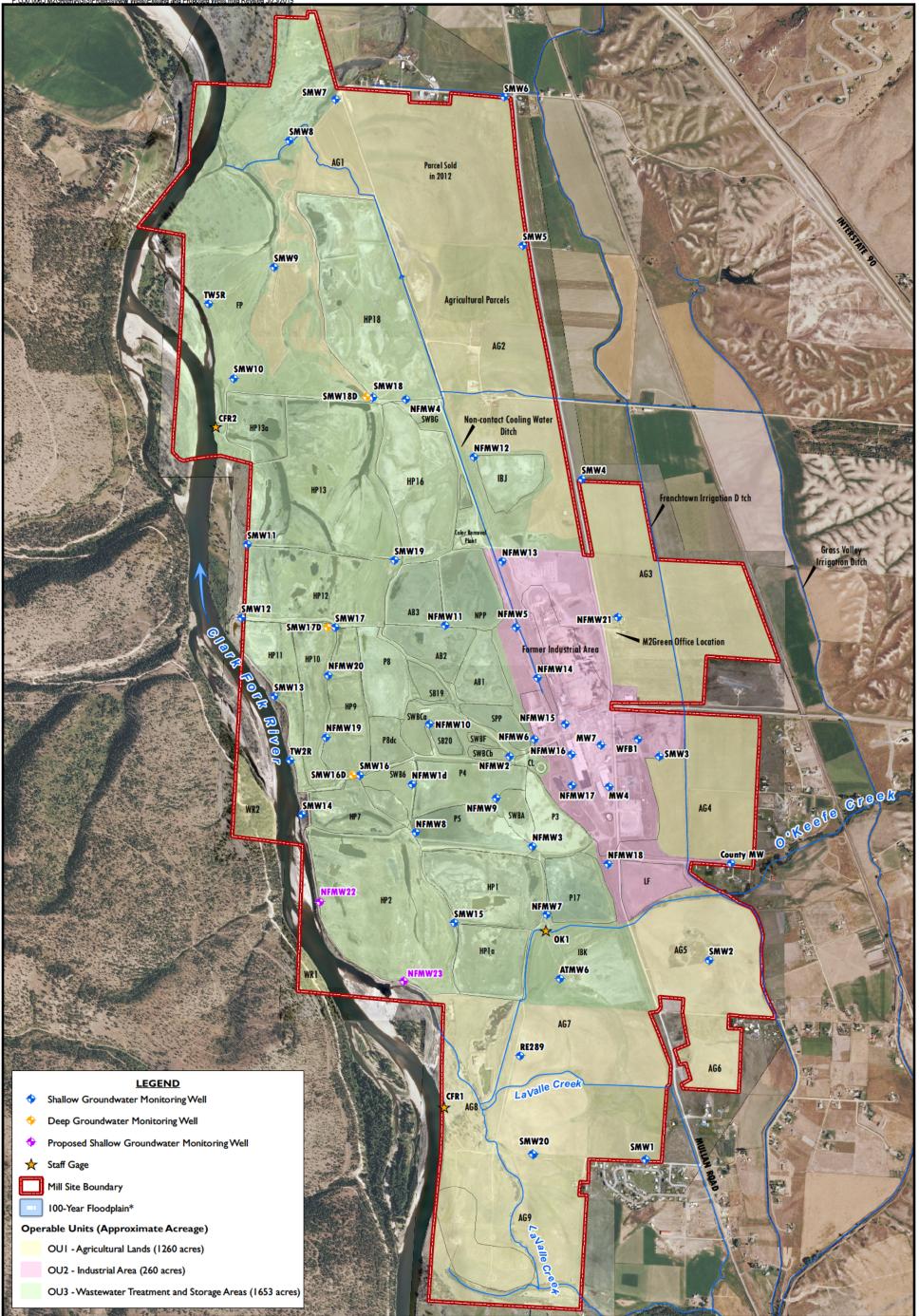
> *Floodplain Source: As defined by the Federal Emergency Management Agency (FEMA) 2013 Digital Flood Insurance Rate Map (DFIRM). (NFIP 2013)

Notes

AG - Agricultural Land AB - Aeration Stabilization Basin CFR - Clark Fork River CL - Clarifier FP - Floodplain HP - Holding or Storage Pond IB - Rapid Infiltration Basin NPP - North Polishing Pond

P - Settling Pond SB - Spoils Basin SPP - South Polishing Pond SWB - Solid Waste Basin WR - West of River

Site Map Former Frenchtown Mill Site Missoula County, Montana FIGURE 2 P:\350.0065 M2





Aerial Photo Source: NA P 2011 and Newfields 2016 (Within Site Boundary)

> *Floodplain Source: As defined by the Federal Emergency Management Agency (FEMA) 2013 Digital Flood Insurance Rate Map (DFIRM). (NFIP 2013)

Notes

AG - Agricultural Land AB - Aeration Stabilization Basin CFR - Clark Fork River CL - Clarifier FP - Floodplain HP - Holding or Storage Pond IB - Rapid Infiltration Basin NPP - North Polishing Pond

P - Settling Pond SB - Spoils Basin SPP - South Polishing Pond SWB - Solid Waste Basin WR - West of River

Existing and Proposed Monitoring Wells Smurfit-Stone/Frenchtown Mill Site Missoula County, Montana FIGURE 3

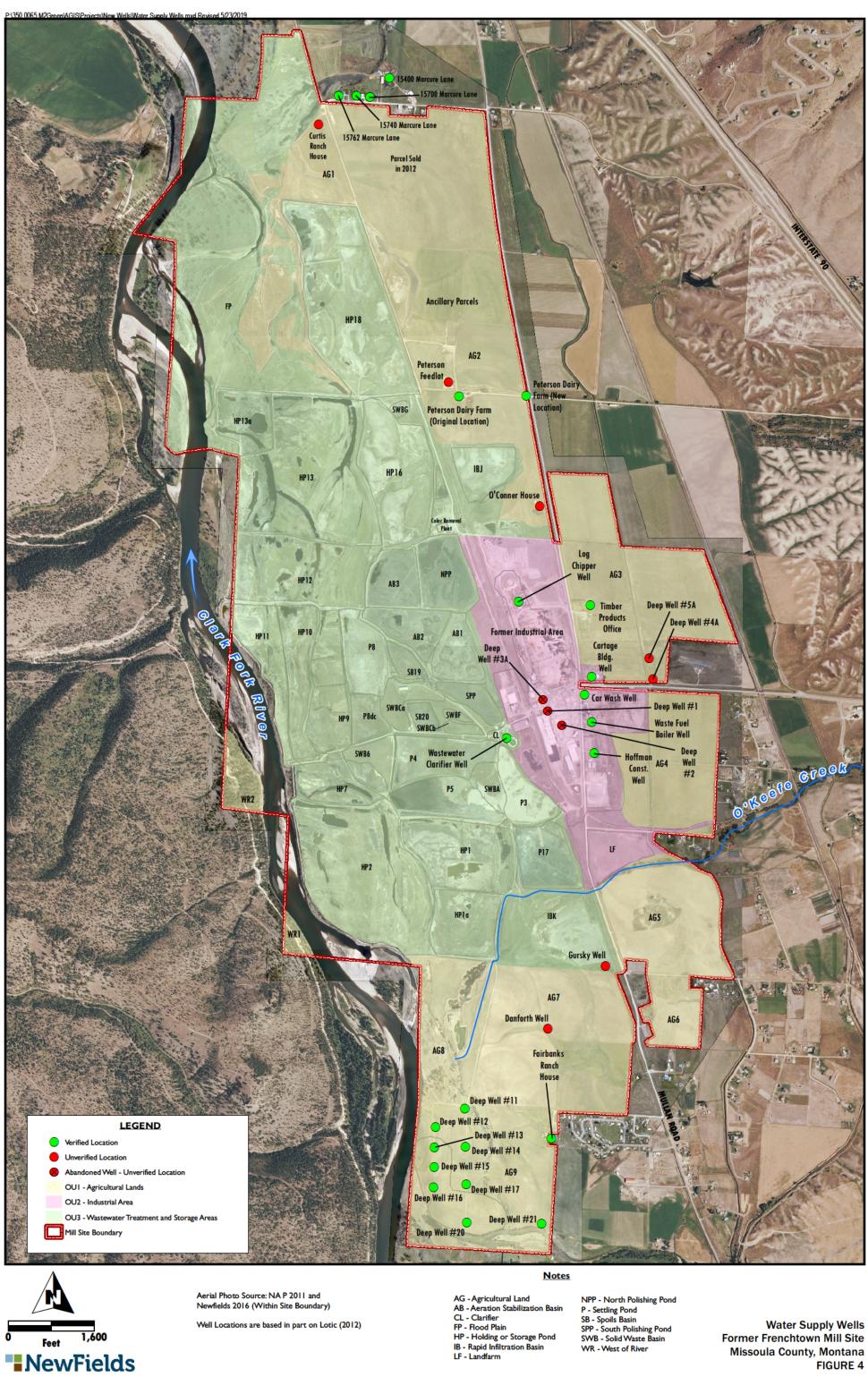




TABLE I Data Quality Objectives - Water Supply Well Evaluation and Monitoring Well Installation Former Frenchtown Mill Site, Missoula County, Montana						
Step I: Problem Statement	Step 2: Identifying the Decisions	Step 3: Decision Inputs	Step 4: Study Boundaries	Step 5: Decision Rules	Step 6: Tolerance Limits on Errors	Step 7: Optimization of Sample Design
A reliable and consistent inventory of Onsite water supply wells does not exist. Concentrations of metals and dioxins/furans in many of the supply wells is unknown. A spatial data gap exists in the shallow monitoring well network west of Holding Pond 2 (HP2). More groundwater data are needed to support human health risk assessment in OU2 and OU3.	Are water supply wells accurately located and available for sampling in a safe manner? Are COPCs present in the potential water supply wells? Are COPCs present in shallow groundwater between HP2 and the Clark Fork River?	A water supply well inventory will be performed to locate unverified wells and assess for potential sampling. Existing data from water supply wells will be evaluated for usability. Groundwater constituent concentrations will be monitored to support human health risk assessment, to identify COPCs, and to evaluate temporal changes in COPC concentrations. Groundwater analytes for the water supply wells includes metals, and dioxins/furans in the Wastewater Clarifier Well. Groundwater analytes for the new shallow monitoring wells include: metals, dioxins/furans, anions, cations, PCBs, VOCs, and SVOCs.	Groundwater will be sampled in representative and available water supply wells located in OU1, OU2, OU3; and new monitoring wells located in OU3. Sampling described in this monitoring plan will be conducted in June and December of 2019. Sampling in 2020 and beyond will be defined in a subsequent monitoring plan.	Groundwater elevations and water quality data will be used to make informed risk management and response action decisions.	Quality assurance and quality control procedures will be conducted and data validation will be performed in accordance with the Quality Assurance Project Plan for the site that was approved by the EPA. Acceptance criteria for the data collected as part of this study are outlined in the Quality Assurance Project Plan (QAPP).	The sampling design has been optimized to ensure that 1) groundwater data for each analyte are obtained during periods of high and low groundwater conditions to support risk management decisions, and 2) the data are obtained at the site based on potential sources and impacts to the CFR, and on observations from past sampling efforts. The sampling design has been optimized to evaluate data gaps in deep and shallow groundwater on the Site.

Table 2 **Potential Water Supply Well Summary**

Former Smurfit-Stone Frenchtown Mill

		Existin	g Information	1					Proposed	Data Collection		
		Well Log	Date of	Total	Approximate	Water Quality Data Available		Verify	Water Level	Water Quality Sampling		
Well Name	Location	(GWIC ID)	Completion	Depth (ft bgs)	Water Level (ft bgs)	Metals	Dioxins/ Furans	Location	Measurement	² Metals/ ³ Conventionals	Dioxins/ Furans	
15400 Marcure Lane	Verfied	267951	12/14/2011	167	-1	•	•	-	-	•	-	
15700 Marcure Lane	Verfied	71209	2/19/1941	154	N/A	•	•	-	-	•	-	
15740 Marcure Lane	Verfied	122456	4/12/1991	160	25	٠	•	-	-	•	-	
15762 Marcure Lane	Verfied	131023	10/10/1992	158.5	18	•	•	-	-	•	-	
Car Wash Well	Verified	71240	6/10/1979	154	19.5	-	-	-	•	•	-	
Cartage Building Well	Verified	706489	1/1/1960	183	21	-	-	-	•	•	-	
Curtis Ranch House	Unverified	706475	I/I/I 94 I	36	N/A	-	-	•	•	•	-	
Danforth Well	Unverified	706496	1/1/1958	40	N/A	-	-	•	•	-	-	
Deep Well #I	Unverified	71248	4/10/1957	173	22.8	-	-	N/A	N/A	N/A	N/A	Abandoned in the
Deep Well #2	Unverified	71250	5/21/1957	174	22	-	-	N/A	N/A	N/A	N/A	Abandoned in the
Deep Well #3	Unverified	71249	6/15/1957	176.5	21	-	-	N/A	N/A	N/A	N/A	Well failure due to
Deep Well #3A	Unverified	210844	4/13/1981	166	29	-	-	N/A	N/A	N/A	N/A	Replacement well
Deep Well #4	Unverified	71251	5/27/1960	174	29	-	-	N/A	N/A	N/A	N/A	Well lost capacity
Deep Well #4A	Verified	71233	4/20/1987	193	27	-	-	-	-	-	-	Replacement well
Deep Well #5	Unverified	71254	8/4/1960	183.6	21	-	-	N/A	N/A	N/A	N/A	Well lost capacity
Deep Well #5A	Verified	71231	8/7/1987	169	28	-	-	-	•	•	-	Replacement well
Deep Well #6	Unverified	71253	8/12/1961	169.3	22	-	-	N/A	N/A	N/A	N/A	Well failed mechar
Deep Well #11	Verified	71266	6/25/1966	162	5.8	-	-	-	-	-	-	
Deep Well #12	Verified	71265	8/29/1973	163	14	•	•	-	-	-	-	
Deep Well #13	Verified	71270	9/26/1978	149.6	15.8	-	-	-	-	-	-	
Deep Well #14	Verified	71269	8/18/1966	160	8.5	-	-	-	-	-	-	
Deep Well #15	Verified	71267	12/11/1976	158	16	-	-	-	-	-	-	
Deep Well #16	Verified	71268	7/19/1978	161.5	15.6	-	-	-	-	-	-	
Deep Well #17	Verified	71263	9/8/1966	162	11.8	-	-	-	-	-	-	
Deep Well #20	Verified	71264	9/12/1966	163	10.8	-	-	-	-	-	-	
Deep Well #21	Verified	160396	1/3/1997	155	17	-	-	-	-	-	-	
Gursky Well	Verified	71237	1/1/1946	35	30	-	-	•	•	-	-	
Hoffman Construction Well	Verified	71239	9/9/1980	158	22	-	-	-	•	•	-	
Fairbanks Ranch House	Verified	706500	1/1/1997	125	N/A	-	-	-	•	•	-	
Log Chipper Well	Verified	71225	1/31/1977	158.5	25	-	-	-	•	•	-	
New Peterson Dairy Farm ⁴	Verified	71223	6/24/1976	163	18	•	•	-	-	-	-	Replacement well f
O'Conner House	Unverified	N/A	5/1/1940	N/A	N/A	-	-	•	•	•	-	Well completion d
Original Peterson Dairy Farm	Verified	71215	11/3/1972	146	35	-	-	-	-	-	-	Well is damaged ar
Peterson Feedlot	Unverified	71221	1/1/1955	161	20	-	-	•	•	•	-	
Timber Products Office Well	Verified	165998	2/18/1998	154	28	-	-	-	•	•	-	
Waste Fuel Boiler Well	Verified	71241	7/25/1978	144	24	•	•	-	-	-	-	1
Wastewater Clarifier Well	Verified	71236	6/24/1970	168.5	27		-		•	•	•	

Notes:

² - Existing information is based on available information from MBMG, DNRC and Mill Records. Well construction details will be confirmed during the water supply well evaluation.

² - Total and Dissolved Metals (Ag, Al, As, Ba, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Ni, Sb, Se, Tl, V, Zn)

³ - Includes Ca, Mg, K, and Na (Method 6010); Nitrate and Nitrite (Method 353.2); Phosphate (Method SM4500-P-E); TOC (Method SM 5310C); Sulfate, Chloride, and Flouride (Method 300.0); TDS

⁴ - "New Peterson Dairy Farm" well has also been referred to as the "Peterson Ranch Well"

Comments

ne 1970s or 1980s.

ne 1970's or 1980's.

to casing shear in 1981, Abandoned in mid-1980s

ell for Deep Well #3. Abandoned in mid-1980s

ty in 1986. Abandoned in 1986 when Deep Well #4A was drilled. ell for Deep Well #4.

ty in 1986. Abandoned in 1986 when Deep Well #5A was drilled. ell for Deep Well #5.

nanically in 1984. Abandoned in 1984.

ell for Original Peterson Dairy Farm

date from water rigtht claim 76M 118465

and not functional

APPENDIX C STANDARD OPERATING PROCEDURES

STANDARD OPERATING PROCEDURES TABLE OF CONTENTS					
SOP	TITLE				
I	Field Log Book and Field Sampling Forms				
2	Equipment Decontamination				
3	Sample Nomenclature, Documentation, and Chain-of-Custody Procedures				
4	Sample Packaging and Shipping				
5	Field Measurement of Groundwater Level				
7	Field Measurement of Electric or Specific Conductance				
8	Field Measurement of pH				
9	Field Measurement of Dissolved Oxygen				
10	Field Measurement of Oxidation Reduction Potential (ORP)				
	Field Sample Filtration				
I2A	Low Flow Groundwater Sampling				
I2C	Water Supply Well Sampling				
15	Monitoring Well Construction				
16	Field Screening of Volatile Organic Compounds in Soil				
17	Monitoring Well Development				
24	Quality Control Sampling				
25	Management of Investigative-Derived Waste				
36	Incident/Accident Investigation And Reporting				
38	Emergency Action Plan				



SOP-I

FIELD LOG BOOK AND FIELD SAMPLING FORMS

Pertinent field investigation and sampling information should be recorded on a daily field log book and appropriate sampling forms to provide a continual record of actions taken each day on the site. Each employee is responsible for completing a record of the day's activities in a log book and field forms of sufficient detail such that someone can reconstruct the field activities without relying on the memory of the field crew. At a minimum, entries on the field log book shall include:

- Project and client name
- Purpose of the field effort
- Names of field crew leader and team members present on the site, and other site visitors
- Description of site conditions and any unusual circumstances, including weather conditions
- Details of actual work effort, particularly any deviations from the field work plan or standard operating procedures
- Location of sample site, including map reference, if relevant
- Field observations
- Field measurements made (e.g., PID readings, pH, temperature) on appropriate forms
- Date and time of initiation and cessation of work

Purpose

Provide guidance on how to document activities completed in the field

Goal and Objective

To provide a record of project work and decisions made in the field

Equipment Needs

Indelible Ink Pen Field Log Book Field Sampling Forms

Specific details for each sample collected should be recorded using NewField's standardized field forms. These field forms contain blank queries to be filled in by field personnel. Items typically recorded on field sampling forms consist of the following:

- Sample name
- Time and date samples were collected
- Number and type (media; natural, duplicate, QA/QC) of samples collected
- Analysis requested
- Sample preservative (if applicable)
- Sampling method, particularly any deviations from standard operating procedures
- Signature of sampler

All entries on the log book and field sampling forms must be made in indelible ink. Upon completion of the field effort, the original log book and field forms shall be scanned and maintained in the project file. Photocopies of original field forms can be used as working documents.

SOP-2

EQUIPMENT DECONTAMINATION

Decontamination of field equipment is necessary to prevent cross-contamination between sites and sampling locations. Decontamination should be performed on all non-dedicated and non-disposable sampling equipment that may contact potentially contaminated

media. Field personnel must wear disposable gloves while decontaminating equipment to prevent cross-contamination.

The following should be done to decontaminate field equipment:

- Set-up a decontamination area, preferably upwind and upgradient from the sampling area.
- Prior to initiating decontamination, visually inspect sampling equipment for evidence of contamination; use stiff brush to remove visible material.
- Once rough brushing is complete, decontaminate each piece of equipment following a sequential process of washing with Alconox or an equivalent degreasing detergent; rinsing with deionized or laboratory grade distilled water; rinsing with 10% dilute nitric acid; and finally rinsing with deionized/distilled water three times. Best procedure is to set up multiple wash tubs for each of the above processes.
- Rinse equipment with 10% dilute methanol instead of nitric acid if sampling for organic contamination.
- Decontaminated equipment that is used for sampling organics should be wrapped in aluminum foil or another inert material if not used immediately.

Field equipment can be decontaminated by steam cleaning as an alternative. If equipment is steam cleaned, it should still be rinsed with 10% dilute nitric acid and deionized/distilled water.

All disposable items (e.g., paper towels, Nitrile gloves) should be deposited into a garbage bag and disposed in a proper manner. Handling and disposal procedures for the rinse and wash water will depend on the likely presence and type of contaminant in the wash water. The project Sampling & Analysis Plan should be reviewed to determine the process for handling wash water.

A list of equipment for decontamination is provided in the green

box to the right. The amount of deionized/distilled water needed on site will depend on the number of samples to be collected and the sampling methods.

Purpose

Describe general decontamination procedures for field equipment

Goal and Objective

To sufficiently clean field equipment to prevent crosscontamination between sites and sample locations

Equipment Needs

5-gallon Plastic Tubs (minimum of four tubs)

Distilled/Deionized Water

I-gallon Container of 10% Nitric Acid

Spray Bottle(s) of 10% Methanol

Alconox Soap

Hard Bristle Brush

Garbage Bags

Disposable Nitrile Gloves

Paper Towels

55-gallon Drums (optional depending on need to containerize wash water)

SOP-3

SAMPLE NOMENCLATURE, DOCUMENTATION, AND CHAIN-OF-CUSTODY PROCEDURES

When completing sampling, it is critical that the process used to label and transport samples to the laboratory for analysis is sufficient to demonstrate with confidence that the samples were collected from the location indicated, and that during transport to the laboratory, no actions were taken to potentially alter the integrity of samples. Without following strict sample labeling and chain-of-custody procedures, analytical data collected at a site have little to no value.

SAMPLE NOMENCLATURE

Samples should be labeled in such a way to allow a person unfamiliar with the site to understand where the samples were collected. Samples should be labeled sequentially as follows:

Project site initials - sample type - sampling method - sample number - sample depth.

For example, sample KR-SBSS-TP1-12', indicates the following: sample was collected at Knife River (KR); sample is a sub-surface soil sample (SBSS); sample is from test pit 1 (TP-1); and sample was collected at depth of 12 feet. Sample or sample site numbers should be numerically sequential (TP1, TP2, etc.). Prior to initiating sampling, field personnel should familiarize themselves with the Sampling & Analysis Plan and the sample nomenclature to be used for the site. The character prefixes in the table below are recommended for sample types.

SAMPLE DOCUMENTATION

In addition to the chain-of-custody forms discussed below, field personnel must keep a list of samples collected at the field in the field log book and on appropriate field sampling forms (see SOP-I). This allows you to go back and verify sample locations and

Purpose

Identify specific requirements for labeling and documenting sample collection

Goal and Objective

To increase confidence in sample locations and to submit samples to the laboratory without risk of integrity loss

Equipment Needs

Indelible Ink Pen Chain-of-Custody Forms Field Log Book Field Sampling Forms

numbers should there be any confusion at a later time. Upon returning to the office, the field log book and forms should be scanned and maintained in the project file, and subsequent copies sent to the laboratory, or other designated parties, as needed.

Each person in the field is responsible for putting entries into the field log and sampling forms. Designating an individual from the sampling team for record keeping is fine, provided all field personnel come to an agreement as to who this will be, and the field crew leader is certain field personnel are familiar with the record keeping requirements. All entries on the log book and field sampling forms must be made in indelible ink.



Sampling Acronym	Label
EB	Equipment Blank
ТВ	Trip Blank
FB	Field Blank
MW	Monitoring Well
DW	Domestic Well
IW	Injection Well
OB	Observation Well
UST	Underground Storage Tank
VE	Vapor Extraction
AA	Ambient Air
SUMP	Sump (Water sample)
POND	Ponds
SPR	Spring
LAKE	Lake
SW	Surface Water, Stream or River
SR	Surface Runoff
GW	Groundwater Sample
ТР	Excavated Test Pit
SS	Surface Soil Sample
SBSS	Subsurface Soil Sample

CHAIN-OF-CUSTODY PROCEDURES

A chain-of-custody form must be generated for all samples collected in the field for laboratory analysis. Samples from more than one project should not be included on the same chain-of-custody form; however, multiple samples from a specific project can be included on the same chain-of-custody form.

Copies of the chain-of-custody form should be maintained in the project file. The sampler may use a NewFields' chain-of-custody form or a form provided by the laboratory. Sample custody records must be maintained from the time of sample collection until the time of sample delivery to the analytical laboratory, and should accompany the sample through analysis and final disposition. Information to be included on the chain-of-custody form will include, but is not limited to:

- Project number/site name
- Sampler's name and signature
- Date and time of sample collection
- Unique sample identification number or name
- Number of containers
- Sample media (e.g., soil, water, vapor, etc.)
- Sample preservative (if applicable)
- Requested analysis
- Comments or special instructions to the laboratory



Each sample must be assigned a unique sample identification number as described above. The information on the chain-of-custody form, including the sample identification number, must correspond to the information recorded by the sampler on the field forms, log book, and label on the sample container.

A sample is considered under a person's control when it is in their possession. When custody of a sample is relinquished by the sampler, the sampler will sign and date the chain-of-custody form and note the time that custody was relinquished. The person receiving custody of the sample will also sign and date the form and note the time that the sample was accepted into custody. The goal is to provide a complete record of control of the samples. Should the chain be broken (signed by the relinquisher, but not receiver, or vice versa), the integrity of the sample is lost and the resulting analytical data are suspect. Samples must be packaged and shipped to the laboratory following the procedures described in SOP-4. If an overnight shipping service is used to transport the samples to the laboratory, custody of the samples must be relinquished to the shipping service. If possible, have the shipping service sign the chain-of-custody form prior to placing the chain-of-custody form in the sample cooler. If this is not possible (i.e., form placed in sealed cooler), a note should be included on the chain-of-custody that the shipping company will receive the samples with the chain-of-custody form inside the sample container.



SAMPLE PACKAGING AND SHIPPING

SAMPLE PACKAGING

Samples must be packaged to preclude breakage or damage to sample containers, and shipped to comply with shipper, U.S. EPA, and U.S. DOT regulations. When packaging samples:

- Use sample labels from the laboratory whenever possible. Place the sample label on the sample container prior to collecting the sample, and use indelible ink when completing the label.
- Place labeled sample bottles in a high quality cooler. Place the samples in an upright position inside the cooler and wrap the samples with cushioning material for protection during transport. The cooler should be able to withstand tough handling during shipment without sample breakage.
- Make sure the cooler has an adequate amount of ice (secured inside sealed Ziploc[®] bags) to maintain a temperature of 4°C or less inside the cooler from the time the samples are placed in the cooler until they are received by the laboratory. Excess ice should be used when sampling in warm weather. Ensure the cooler drain plug is taped shut.
- Fill out the appropriate chain-of-custody forms and place them in a Ziploc bag and tape it to the inside lid of the shipping container. If more than one cooler is used per chain-of-custody form, put a photocopy of the form in the other coolers and mark them as a copy.
- Close and seal the cooler using strapping shipping tape.
- Place signed and dated sample custody seals on the outside of the cooler such that the seals will be broken when the cooler is opened. Secure the custody seals on the cooler with clear strapping tape.
- Secure a shipping label with address, phone number, and return address on the outside of the cooler where it is clearly visible.

SHIPPING HAZARDOUS MATERIALS/WASTE

Transportation regulations for shipping of hazardous substances and dangerous goods are defined by the U.S. DOT in 49 CFR, Subchapter C, Part 171 (October I, 1988); IATA and ICAO. These regulations are accepted by Federal Express and other ground and air carriers.

Purpose

Ensure samples are properly packaged for shipment to the analytical laboratory

Goal and Objective

To have samples received by the analytical laboratory in good condition and within EPA temperature thresholds

Equipment Needs

Indelible Ink Pen Chain-of-Custody Forms Custody Seals Sample Labels from Lab Coolers and Ice Strapping Tape Field Sampling Forms Ziploc Bags



According to U.S. DOT regulations, environmental samples are classified as Other Regulated Substances (ORS). ORS are articles, samples, or materials that are suspected or known to contain contaminants and/or are capable of posing a risk to health, safety, or property when transported by ground or air. Samples, substances, or materials from sources other than material drums, leachate streams, and sludges should be considered as ORS or environmental samples. Materials shipped under the classification of ORS must not meet any of the following definitions:

Class I: explosives; Class 2: gases-compressed, liquefied, dissolved under pressure, or deeply refrigerated; Class 3: flammable liquids; Class 4: substances susceptible to spontaneous combustion; Class 5: oxidizing substances; Class 6: poisonous (toxic and infectious); Class 7: radioactive materials; and/or Class 8: corrosives.

If your samples might meet any of the above definitions, contact the project manager to obtain instructions on sample shipment.



FIELD MEASUREMENT OF GROUNDWATER LEVEL

FIELD PROCEDURE

- Verify the water level indicator is operating correctly prior to leaving for the field by placing probe in tap water to test the buzzer and light. Repair as necessary. Make certain the meter and extra batteries are in the carrying case. Verify that the water level indicator cable length is sufficient to reach estimated water level depths.
- Prior to collecting a measurement, decontaminate the water level indicator (see SOP-2), and check probe cable depth markings with a measurement tape. Note any corrections to water level meter measurements on field form.
- Measure all wells (monitoring and domestic) from the top of the well casing in the north quadrant or from a designated measuring point. Measure and record the distance from the measuring point to ground level. Make sure the measuring point is labeled on the well, so future measurements can be made from the same location.
- Measure depth to water from the measuring point to the nearest hundredth of a foot.

Purpose

Ensure groundwater levels are accurately measured in the field

Goal and Objective

To obtain accurate and precise water level measurements

Equipment Needs

Water Level Indicator Extra Set of Batteries Indelible Ink Pen Field Sampling Form Field Log Book Decontamination Supplies

- Record measurements on the appropriate field form. Also record the presence/absence of free product on the field forms, as appropriate.
- Decontaminate the water level meter between each measurement following procedures described in SOP-2.
- If free product is known or suspected to be present in a well, an oil-water level indicator or other method should be used to measure the depth to water and thickness of free product in the well, as described in SOP-6.

SOP-7

FIELD MEASUREMENT OF ELECTRIC CONDUCTIVITY (EC) OR SPECIFIC CONDUCTANCE (SC)

INSTRUMENT CALIBRATION

The conductivity meter should be calibrated prior to each sampling event following the manufacturer's recommendations. If the instrument is a multi-parameter meter, follow the instructions for measurement of electric conductivity (EC) or specific conductance (SC) from the manual.

Prior to conducting field measurements, verify the EC/SC meter automatically corrects for temperature variations. If the meter does not, apply the appropriate temperature correction to the field measurements.

FIELD MEASUREMENT PROCEDURE

Rinse a decontaminated glass container or plastic flow-through cell with sample water. Fill the container or flow-through cell with sample water, with enough available space to insert the EC/SC probe without undesired overflow.

Rinse the EC/SC or multi-parameter probe with deionized or distilled water and place it in the beaker of sample water. Immerse the probe in sample and move it around to displace any air bubbles. Keep the probe tip off of the sides of the beaker. Record the conductivity value from the meter on the field form.

Purpose

To ensure measurement of EC/SC is done consistently and correctly in the field

Goal and Objective

To obtain accurate EC/SC measurements in the field

Equipment Needs EC/SC Meter Calibration Standard(s) Measurement Container Extra Set of Batteries Indelible Ink Pen Field Sampling Form Deionized/Distilled Water

Be sure to recognize the units of the meter reading value (i.e., microsiemens/centimeter (μ S/cm), micromhos/centimeter (μ mhos/cm), or millisiemens/centimeter (mS/cm)). Record the reading on the field sampling form and field log book. If the reading is being taken in-situ or using a flow-through cell, wait until the reading stabilizes and record it on the sample field form.

Remove the probe from sample and decontaminate probe. Store the probe following the manufacturer's recommendations. Refer to SOP-2 for complete decontamination procedures.

SOP-8

FIELD MEASUREMENT OF PH

INSTRUMENT CALIBRATION

The pH meter must be calibrated prior to each field event and after every 10 samples during a sampling event, or more frequently if required by the project/client. Follow the manufacturer's recommendations to calibrate the meter. This typically involves the following sequence of steps:

- 1. Verify sensor is clean and filled with solution, then turn on meter.
- 2. Place in pH 7 solution, press "cal", and wait until calibration is complete.
- 3. Rinse sensor in deionized or distilled water.
- 4. Place in pH 10 (or pH 4) buffer solution, press "cal" a second time, and wait until endpoint is reached.
- 5. Rinse in distilled water.

Three-point calibration is the standard procedure. If the instrument is a multi-parameter meter, follow instructions for measurement of pH from the manual.

Periodically throughout the field day, place the probe in 7.0 pH buffer solution. If the measured value differs from the expected

value by more than 0.1 pH units, recalibrate the meter according to the manufacturer's instructions.

FIELD MEASUREMENT PROCEDURE

- Rinse a decontaminated glass beaker or plastic flow-through cell with sample water three times.
- Rinse the pH probe with deionized or distilled water.
- Fill the container with sample water.
- Immerse the probe in the sample and agitate it to provide thorough mixing. Continue to agitate until the reading has stabilized. Read the pH value from the meter to the nearest 0.1 standard unit (s.u.) and record on the field sampling form. If the reading is being taken in-situ or using a flow-through cell, wait until the reading stabilizes and record the final pH value.
- Note any problems such as erratic readings. If previous readings are available, compare the current measurement to previous reading to check that the current reading is within reasonable limits.
- Rinse probe with deionized or distilled water and store according to the manufacturer's instructions (see SOP-2 for complete decontamination procedures).

Purpose

Provide guidelines for pH measurements in water samples

Goal and Objective

To obtain accurate pH measurements in the field

Equipment Needs pH Meter Calibration Standards Glass Container or Flowthrough Cell Extra Set of Batteries Indelible Ink Pen Field Sampling Form Deionized/Distilled Water



FIELD MEASUREMENT OF DISSOLVED OXYGEN (DO)

INSTRUMENT CALIBRATION

Before each use, clean and rinse the dissolved oxygen (DO) electrode tip in accordance with

decontamination procedures outlined in SOP-2. Verify that the membrane cap has been filled with DO electrolyte in accordance with manufacturers required maintenance schedule.

Calibrate the probe and meter using the fresh water-air calibration method described in the manufacturer's manual. Correct the calibration value for temperature and altitude and adjust the meter accordingly. Sensor can maintain polarization when disconnected from the meter for up to three hours.

FIELD MEASUREMENT PROCEDURE

Place the probe directly into the stream or well to be measured. If possible, place the probe into a flow-through cell receiving a continuous stream of water from the source being measured. Allow sufficient time for the probe to stabilize to sample temperature and DO concentration. Record the DO value on the field form. Rinse probe with deionized or distilled water when measurement is complete.

If sensor will not calibrate, becomes sluggish or erratic:

- Clean tip and refill cap with DO electrolyte in accordance with manufacturer's instructions (care must be taken to eliminate air bubbles from inside probe, and probe tip must be scarified using manufacturer-provided sandpaper).
- Check membrane for damage; replace if necessary.
- Check meter with test plug.
- Replace battery.

-

Purpose

Provide guidelines for dissolved oxygen measurements in water samples

Goal and Objective

To obtain accurate dissolved oxygen measurements in the field

Equipment Needs

Dissolved Oxygen Meter Deionized/Distilled Water Calibration Cup Extra Set of Batteries Indelible Ink Pen Field Sampling Form

SOP-10

FIELD MEASUREMENT OF OXIDATION-REDUCTION POTENTIAL (ORP)

INSTRUMENT CALIBRATION

The oxidation-reduction potential (ORP) meter should be calibrated prior to each sampling event following the manufacturer's recommendations. If the instrument is a multiparameter meter, follow the instructions for measurement and calibration of ORP. Use table of temperature adjustment information provided with the instrument instructions.

FIELD MEASUREMENT PROCEDURE

- Decontaminate a clean plastic or glass container with deionized or distilled water.
- Rinse the ORP electrode with deionized or distilled water and then with sample water prior to inserting it into the sample beaker.
- If possible, obtain an in-situ measurement of ORP. If not possible, preferably use a flow-through cell receiving a constant stream of water from the well or sample source material. If obtaining a sample for ORP measurement, minimize agitation of the sample in an effort to limit exposure to oxygen.
- Immerse the ORP electrode in the sample and allow at least one minute for the probe to equilibrate with the water.
- Obtain a reading to the nearest 10 millivolts (mV).
- Record the reading on standardized field form. Note any problems such as erratic or drifting readings.
- Decontaminate the probe in accordance with SOP-2.

Purpose

Provide guidelines for ORP measurements in water samples

Goal and Objective

To obtain accurate ORP measurements in the field

Equipment Needs

Deionized/Distilled water Calibration solution with table of temperature adjustment information

Extra set of batteries

Indelible Ink Pen

Field Sampling Form



SOP-II

FIELD SAMPLE FILTRATION

FIELD PROCEDURE

- Set-up a system whereby water samples can be filtered, including a filter apparatus/pump for retrieving water from a well or water body.
- To avoid the need for decontamination, use disposable tubing and equipment, if possible.
- If using a hand-vacuum pump, place groundwater or surface water into a vessel that can be pressurized using the hand-vacuum pump.
- Filtered effluent from the pump can be placed directly into sample containers post-filtering with a disposable 0.45 micron (µm) filter. The filter can be attached in-line with sampling tubing.
- As appropriate, fill pre-preserved, laboratory supplied sample containers with filtered sample and cap each container.
- Invert sample container several times to insure complete sample-preservative mixing, if applicable.
- Place samples into cooler; package and ship in accordance with SOP-4.
- If extremely turbid sample water is obtained, may need to pre-filter the sample using 3.0 or 5.0 micron filter paper followed by 0.45 micron filtration.

Purpose

Provide guidelines for filtering water samples in the field

Goal and Objective

To employ a method of filtering samples in the field, thus removing sediment from the sample and allowing for analysis of dissolved constituents in the sample

Equipment Needs

0.45, 3.0, and 5.0 micron Disposable Filters Sample Collection and Filter Apparatus (Pump) Preservatives, as required Indelible Ink Pen

Field Sampling Form

• Decontaminate, if necessary, all sample collection equipment in accordance with the SOP-2.



LOW FLOW GROUNDWATER SAMPLING

Prior to initiating groundwater sampling, all equipment should be inspected for damage and repaired/replaced, if necessary. Have onhand: copies of well logs; sampling and analysis plan or work plan; any previous site sampling information/data; field planning worksheet; and field forms. Check with project manager to be sure you understand what type of pump(s) will be used to purge and sample groundwater. Equipment to be placed down-hole must be decontaminated in accordance with SOP-2.

Begin sampling at the well containing the lowest level of contamination, and sample wells in succession based on increasing contaminant concentrations. If the relative degree of concentrations cannot be determined, wells should be sampled in order of increasing proximity to the suspected source of contamination, preferably from the perimeter towards the center of the site.

A standard field sampling form must be completed for each well to document purging and sampling in accordance with relevant SOPs; individual sampling forms must also be completed for any field quality control samples (e.g., duplicates, rinsate blanks, and field blanks).

WATER LEVEL MEASUREMENT

Before purging each well, record the depth to water from the designated measuring point on the top of the well casing (or the north side of the top of casing if a measuring point is not identified) to the nearest 0.01-foot using an electronic water level meter in accordance with SOP-5. If sampling at a site where there may be free product, wells shall be checked for the presence of free product prior to purging and sampling using an oil-interface probe in accordance with SOP-6. Determine the thickness of free product by subtracting the depth to free product from the depth to water.

Record the following dimensions on the groundwater sampling form: depth to water; total well depth; depth to top of screened interval; depth to bottom of screened interval; depth to top of filter pack interval; and depth to bottom of filter pack interval. Well and filter pack depth information should be referenced from the well log; do not measure total depth of the well prior to purging and sample collection to avoid resuspension of any settled solids which may have accumulated within the casing. Use the following formula to calculate the volume of water present in the well casing (casing volume):

Purpose

Provide guidelines for low flow sampling of groundwater

Goal and Objective

To employ a method of collecting groundwater samples that is representative of the chemistry of the aquifer

Equipment Needs

5-gallon Bucket, graduated in gallons

Purge/Sampling Pump(s)

Oil-Interface Probe, as necessary

Water Level Meter

Meters or Flow-through cell to measure temperature, pH, EC/SC, DO, and ORP.

Filtering apparatus/pump (if filtering samples)

Sample Containers

Preservatives, as required

Field Planning & Sampling Forms

Decontamination Supplies

Tubing for pump (include air-line and water-line for bladder pump)

Disposable bladders and O-ring kit for bladder pump

Generator or Power Supply; controller for bladder pumps

Coolers and Ice

Stop-watch

Rope and Bailer (for backup)



V = 3.14*(r²)*d*7.48 <u>Where</u>: V = volume (gallons) r = well radius (feet) d = depth of water or saturated thickness in well (feet)

The radius of the filter pack will be used for the well radius (r) for calculating borehole volumes, if required. For example, a 2-inch diameter PVC monitoring well installed in a 6-inch diameter hole with sand filter pack would use a well radius of 3 inches or 0.25 foot.

LOW FLOW PURGING

The goal of low flow purging is to collect water samples that reflect the total mobile organic and inorganic loads transported through the subsurface under ambient flow conditions, with minimal physical and chemical alterations from sampling operations. During low flow purging, emphasis is placed on minimizing hydraulic stress at the well-aquifer interface by maintaining low water-level drawdowns, and by using low pumping rates during purging and sampling operations. Low flow purging can be completed using a submersible pump and low flow controller, an air or nitrogen powered bladder pump, or a peristaltic pump where appropriate (e.g., shallow wells; sampling for non-volatile constituents). The specific pumping method shall be chosen based on depth to groundwater, diameter of well, existing well configuration, and contaminant(s) of concern.

Decontaminated or dedicated low flow sampling equipment shall be used for purging and sampling. The pump and disposable tubing should be lowered gently and slowly, and set within the upper third or fourth of the screened interval. If the static water level is below the top of the screen, then the pump shall be lowered to within the upper third or fourth of the water column. In either case, the pump intake will be placed a sufficient distance above the bottom of the well to avoid mobilization of any accumulated sediment.

Purge at a rate of 0.1 to 0.5 liter per minute (Lpm) while monitoring drawdown of the water level in the well using an electronic water level meter every 5 minutes. If drawdown exceeds 0.3 foot (0.1 meter), reduce the purge rate accordingly. Purging rates should, as needed, be reduced to the minimum capabilities of the pump to ensure drawdown of less than 0.3 foot or stabilization of the water level. If the minimal drawdown that can be achieved exceeds 0.3 foot, but remains stable, continue purging until three casing volumes are removed and/or water quality parameters stabilize (see below).

Indicator field parameters (see below) are monitored every 5 minutes during purging in order to determine when sample collection may begin in accordance with the stabilization goals specified in the table below. Indicator field parameters, including pH, Oxidation/Reduction Potential (ORP), Electrical Conductivity (EC) or Specific Conductance (SC), Temperature, and Dissolved Oxygen (DO) should be measured using a flow-through cell. Turbidity should be measured using discharge from a T-valve located upstream of the flow-through cell. Turbidity should not be measured downstream of the flow-through cell because it can entrain suspended solids resulting in inaccurate turbidity readings.



Indicator Parameter	Units	Stabilization Goal	Comment
рН	standard units (s.u.)	+/- 0.1 s.u. between three readings	
Electrical Conductivity (EC) or Specific Conductance (SC)	microsiemens, millisiemens, or micromhos per centimeter (µS/cm, mS/cm or µmhos/cm)	+/- 3% between three consecutive readings	
Oxidation/Reduction Potential (ORP)	millivolts (mV)	+/- 10 mV between three consecutive readings	
Temperature	degrees Celsius (°C)	+/- 3% between three consecutive readings	
Dissolved Oxygen (DO)	milligrams per liter (mg/L)	+/- 10% between three readings or <0.5 mg/L	Considered stable if three DO values are less than 0.5 mg/L
Turbidity	Nephelometric Turbidity Units (NTU)	+/-10% between three readings and <10 NTU	If turbidity is >10 NTU, consider stable if three turbidity values are +/- 10%

Note that the stabilization criteria listed in the table above are goals, and may not be achievable under all situations. Dissolved oxygen and turbidity generally require the longest time to stabilize. A turbidity value of 10 NTU may not be achievable in all monitoring wells. In the event that turbidity stabilizes (+/- 10% between three readings) above 10 NTU, proceed with sample collection and note the suspected reason(s) for the elevated turbidity. Attempt to remedy the elevated turbidity for subsequent sampling events at a given monitoring well or site. Remedies for elevated turbidity may include: well re-development, slightly higher pump placement, slower submersion of the sampling pump and tubing, and/or a reduced purge rate.

If the water level recovery of a low-yield well exceeds 2 hours after purging, a sample shall be extracted as soon as sufficient volume is available in the well. At no time should a monitoring well be pumped dry if the recharge rate results in formation water to cascade down the well screen, causing an accelerated loss of volatiles and possible change in pH.

COLLECTING WATER QUALITY SAMPLES

Label each sample container with project number, sample location, well owner, date, military time (24hour), sampler's initials, preservative, and analysis required. Wear new disposable latex or nitrile gloves immediately prior to obtaining the sample.

Verify that the appropriate preservatives were added by the analytical laboratory, or should be added by field personnel. If required, add the necessary preservative to the appropriate sample container prior to sample collection (see table below).

Prior to filling the sample container, disconnect the flow-through cell from the pump discharge tubing while the well is still being purged. Water quality samples should never be collected downstream of the flow-through cell because the flow-through cell can entrain suspended sediment and result in a cross-contaminated sample volume with a biased concentration of analytes. Place the pump's discharge tubing directly above the receiving sample container and add the sample volume directly to the bottle, minimizing turbulence as much as possible. For volatile analyses, fill appropriate vials at the rate of about 100 milliliters



per minute (mL/min) (24 seconds to fill a 40 mL vial) or less. Fill each sample vial completely so the water forms a convex meniscus at the top to ensure that no head space exists in the vial after it has been capped. After filling, immediately cap, invert, and gently tap the vial to check for trapped air. If air bubbles are present, un-cap vial, add slightly more sample water and repeat procedure. If air bubbles are still present, discard the vial and fill another sample vial.

If analyzing for dissolved constituents, add field filter (usually 0.45 micron (μ m) pore size) to the end of the pump's discharge line, and then fill the appropriate container(s).

Samples should be preserved as described in the table below, unless otherwise specified by the laboratory.

Parameter	Number of Bottles	Container	Preservation	Maximum Holding Time Extraction/ Analysis
VOCs	3	40 mL glass vial	≤6°C & HCL	14 days to analysis
SVOCs	2	I L glass	≤6°C	7 days / 40 days from extraction to analysis
Metals	I	500 mL plastic	≤6°C & HNO3	6 months to analysis; mercury 28 days to analysis
Nutrients	I	500 mL plastic	≤6°C & H2SO4	Varies – contact laboratory for additional information
Common lons	I	I L plastic	≤6°C	7 days / 40 days from extraction to analysis

Note: VOC = volatile organic compound; SVOC = semi-volatile organic compound; mL = milliliter; L = liter; HCL = hydrochloric acid; HNO₃ = nitric acid; H₂SO₄ = sulfuric acid; C = Celsius.

Properly cap and lock the well when sampling is complete. In the field notebook, record any damage to the well, monument, or items related to the well that need attention or repair prior to the next sampling event.

Purge water must be handled in accordance with SOP-25 for management of investigative-derived wastes. Groundwater purged from a well during purging or sampling that has a sheen or contains free product must be containerized in an appropriately labeled 55-gallon drum or tank pending receipt of analytical results. A drum should be dedicated to each well sampled so that analytical results of the groundwater sample can be used to characterize the water in the drum. Groundwater that contains no free product, sheen, or odors may be discharged directly to the ground if approved by the property owner. If groundwater is discharged directly to the ground, attention must be given to avoid direct recharge of shallow groundwater with purge water near the well. Purge water must be discharged downgradient and at an adequate distance from the well to be sampled to avoid mounding and interference with the water table.

Complete the necessary sample handling paperwork (SOP-3), sample handling, packaging, and shipping (SOP-4), and record all pertinent information on field sampling forms and field logbook (SOP-1).



WATER SUPPLY WELL GROUNDWATER SAMPLING

Prior to initiating groundwater sampling, all equipment should be inspected for damage and repaired/replaced, if necessary. Check with project manager to be sure you understand what type of pump(s) will be used to purge and sample groundwater (i.e., existing pump(s) in the water supply well(s)). Equipment to be placed down-hole must be decontaminated in accordance with SOP-2.

If applicable, begin sampling at the well containing the lowest level of contamination, and sample wells in succession based on increasing contaminant concentrations. If the relative degree of concentrations cannot be determined, wells should be sampled in order of increasing proximity to the suspected source of contamination, preferably from the perimeter towards the center of the site.

Field sampling forms must be completed for each well to document purging and sampling in accordance with relevant SOPs.

WATER LEVEL MEASUREMENT

If required, open the well cap and remove any excess submersible pump wiring that may be present. If the wiring or wiring insulation appears damaged, do not proceed with sampling and notify the well owner. Be careful to not disturb any wire nuts or connections that may be present in or on the well.

Before purging each well, record the depth to water from top of well casing to the nearest 0.01-foot using an electronic water level meter in accordance with SOP-5. Water level measurements in wells with permanent submersible pumps installed can be difficult as the water level meter may become snagged on the pump wiring. If the water level meter becomes snagged, remove it using increasingly gradual tugs, avoiding shock loads on the water level tape when possible. An alternative type of water level meter to consider is a sonic-type meter that requires no in-hole probe; however, these instruments have less-accurate water level measurements.

If sampling at a site where there may be free product, wells shall be checked for the presence of free product prior to purging and sampling using an oil-interface probe in accordance with SOP-6. This may be difficult in an existing supply well that has a down-hole pump and wiring. Determine the saturated thickness of free product by subtracting the depth to product from the depth to water.

Purpose

Provide guidelines for sampling groundwater

Goal and Objective

To employ a method of collecting groundwater samples that is representative of the chemistry of the aquifer

Equipment Needs

5-gallon Bucket, graduated in gallons

Purge/Sampling Pump(s) Oil-Interface Probe, as necessary

Water Level Meter

Meters or Flow through cell to measure temperature, pH, EC/SC, DO, and ORP.

Filtering apparatus/pump (if filtering samples)

Sample Containers

Preservatives, as required

Field Sampling Forms

Decontamination Supplies

Tubing, as needed

Generator or Power Supply Coolers and Ice

Stop-watch

Rope and Bailer (for backup)



Record the following dimensions on the groundwater sampling form: depth to water; total well depth; depth to top of screened interval; depth to bottom of screened interval; depth to top of filter pack interval; and depth to bottom of filter pack interval. With the exception of depth to water, this information should be obtained from the well log, if available. Use the following formula to calculate the volume of water present in the well screen:

V = 3.14*(r²)*1*7.48 <u>Where</u>: V = volume (gallons) r = well radius (feet) I = length of saturated well screen (feet)

WELL PURGING

To obtain a representative sample of groundwater, wells shall be purged of a minimum of three well screen volumes and when field water quality parameters have stabilized. Connect a flow-through cell to the well discharge using a slip stream sampling device or sampling port.

If required, connect the generator to the pump leads and start the generator. Position the generator downwind of the well at a distance of greater than 20 feet to avoid sample contamination. Begin purging the well and monitor field parameters.

Field parameters shall be measured every 5 minutes using a flow-through cell, with a minimum of six parameter measurements completed before stabilization is determined as noted below. For this method, a minimum of three well screen interval volumes will be removed prior to sample collection. If field water quality parameters fail to stabilize, a minimum of six well screen volumes should be removed prior to sample collection. If information on the well screen interval is not available, then purging will be evaluated using only the stabilization of water quality parameters.

Turbidity should be measured using discharge from a "tee valve" located upstream of the flow through cell. Turbidity should not be measured downstream of the flow-through cell because it can entrain suspended solids resulting in an elevated turbidity reading.

Indicator Parameter	Units	Stabilization Goal	Comment
PН	standard units (s.u.)	+/- 0.1 s.u. between three readings	
Electrical Conductivity (EC) or Specific Conductance (SC)	Microsiemens, millisiemens, or micromhos per centimeter (µS/cm, mS/cm or µmhos/cm)	+/- 3% between three consecutive readings	
Oxidation/Reduction Potential (ORP)	millivolts (mV)	+/- 10 mV between three consecutive readings	
Temperature	degrees Celsius (°C)	+/- 3% between three consecutive readings	
Dissolved Oxygen (DO)	milligrams per liter (mg/L)	+/- 10% between three readings or <0.5 mg/L	Considered stable if three DO values are less than 0.5 mg/L
Turbidity	Nephelometric Turbidity Units (NTU)	+/-10% between three readings and <10 NTU	If turbidity is >10 NTU, consider stable if three turbidity values are +/- 10%



Note that the stabilization goals listed in the table above are goals, and may not be achievable under all situations.

If the recovery of a low-yield well exceeds 2 hours after purging, a sample shall be extracted as soon as sufficient volume is available in the well. At no time should a well be pumped dry if the recharge rate results in formation water to cascade down the well screen, causing an accelerated loss of volatiles and change in pH.

COLLECTING WATER QUALITY SAMPLES

Label each sample container with project number, sample location, well owner, date, military time (24-hour), sampler's initials, preservative, and analysis required. Wear new disposable latex or nitrile gloves immediately prior to obtaining the sample.

Prior to filling the sample container, disconnect the flow-through cell from the pump discharge tubing while the well is still being purged. Water quality samples should never be collected downstream of the flow through cell, as the flow through cell can entrain suspended sediment and result in a cross-contaminated sample volume with a high biased concentration of analytes.

Verify that the appropriate preservatives were added by the analytical laboratory. If required, add preservative to the sample container prior to sample collection. Place the discharge tubing directly above the receiving sample container and add the sample volume directly to the bottle, minimizing turbulence as much as possible. For volatile analyses, fill vials at the rate of about 100 milliliters per minute (mL/min) (24 seconds for 40 mL vial) or less. Fill each sample vial completely so the water forms a convex meniscus at the top to ensure that no head space exists in the vial after it has been capped. After filling, immediately cap, invert, and gently tap the vial to check for trapped air. If air bubbles are present, un-cap vial, add slightly more sample water and repeat procedure. If air bubbles are still present, discard the vial and fill another sample vial.

If analyzing for dissolved constituents, add field filter (usually 0.45 μ m pore size) to the end of the discharge line.

Parameter	Number of Bottles	Container	Preservation	Maximum Holding Time Extraction/ Analysis
VOCs	2	40 mL glass	≤6°C & HCL	14 days to analysis
SVOCs	I	I L glass	≤6°C	7 days/40days from extraction to analysis
Metals	I	500 mL plastic	≤6°C & HNO ₃	6 months to analysis; mercury 28 days to analysis
Nutrients	I	500 mL plastic	≤6°C & H₂SO4	Varies – contact laboratory for additional information
Common lons	I	I L plastic	≤6°C	7 days/40 days from extraction to analysis

Samples should be preserved as described in the table below, unless otherwise specified by the laboratory.

Note: VOC = volatile organic compound; SVOC = semi-volatile organic compound; mL = milliliter; HCL = hydrochloric acid; HNO₃ = nitric acid; H₂SO₄ = sulfuric acid; C = Celsius.



Properly cap and lock the well when sampling is complete. Note any damage to the well, monument, or items related to the well that need attention or repair prior to the next sampling event.

Purge water must be handled in accordance with SOP-25 for management of investigative-derived wastes. Groundwater purged from a well during purging or sampling that has a sheen or contains free product must be containerized in an appropriately labeled 55-gallon drum or tank pending receipt of analytical results. A drum should be dedicated to each well sampled so that analytical results of the groundwater sample can be used to characterize the water in the drum. Groundwater that contains no free product, sheen, or odors may be discharged directly to the ground if approved by the property owner. If groundwater is discharged directly to the ground, attention must be given to avoid direct recharge of shallow groundwater with purge water near the well. Purge water must be discharged down-gradient and at an adequate distance from the well to be sampled to avoid mounding and interference with the water table.

Complete the necessary sample handling paperwork (SOP-3), sample handling, packaging, and shipping (SOP-4), and record all pertinent information on field sampling forms and field log book (SOP-1).



MONITORING WELL CONSTRUCTION

Monitoring well construction specifications may differ from those listed in this SOP. The site specific Fields Sampling Plan (FSP) should be consulted prior to any well installation to ensure objectives are met.

MONITORING WELL CONSTRUCTION

- Arrive on site with the appropriate decontaminated drilling equipment and materials for site conditions. Be sure to review the Field Sampling Plan (FSP) to determine anticipated lithology. Drilling method, filter pack and wellscreen slotting should be predetermined and based on the site lithology.
- Ensure that the driller has properly decontaminated all drilling equipment and materials prior to arrival on site, in accordance with SOP-2.
- Many states now require certification and licensing for monitoring well drillers. Verify the driller is licensed in the State (if required) prior to beginning fieldwork.
- Safety equipment required drilling is mandatory. All NewFields personnel must comply with the site-specific HASP and SOP-24.
- Acceptable drilling techniques for the installation of monitoring wells include air- rotary, cable tool, and hollowstem auger. If unconsolidated material is encountered, it may be necessary to drive steel casing during drilling to maintain borehole integrity.
- Appropriate decontamination of drilling equipment between well installations is required and should be completed in accordance with SOP-2. Cross contamination of water bearing zones by drilling must be avoided.
- Drilling mud or drilling solutions of any kind are not to be used during drilling activities in conjunction with monitoring well construction.

Purpose

Provide guidelines for installing monitoring wells in the field

Goal and Objective

To employ a standard method of installation monitoring wells, which will allow for collection of representative groundwater samples

Equipment Needs

Drilling system

Well completion material (screen, filter pack, borehole seal, and surface seal) consistent with anticipated lithology

Hand lens (10) power

USGS Soil Classification Chart and Munsel color book Latex or Nitrile gloves Boring Log and field book Field forms and field book

- Investigation derived waste protocols outlined in the FSP must be followed.
- Subsurface samples shall be collected by the driller at intervals specified in the FSP. Down-hole soil samples should be collected in accordance with SOP-14.
- A detailed lithologic boring log must be completed by field staff during drilling activities on standard lithologic field forms with additional notes detailed in the field book (SOP-1). Soils



should be described on the log according to the procedures outlined in the United Soil Classification System (USCS; method ASTM D2487) or the Soil Conservation Service (SCS) classification system. Soil texture should be classified by either the USCS or the U.S. Department of Agriculture (USDA) classification, if necessary. Water bearing characteristics of the formations should also be noted on the log. In addition, details of monitoring well construction should be described on the well log including total depth, perforated interval, sizes, depths, and types of construction materials, etc.

- When completing the well, install factory slotted well screen (size dependent on lithology, length is dependent on site conditions) and blank flush threaded PVC well casing unless other specified in the FSP. Thickness of PVC (schedule 40 vs schedule 80) will be dependent on depth of well instillation, and as defined in the FSP.
- After borehole is drilled and well is positioned in the borehole by the driller, emplace chemically inert silica sand in the annular space from well depth to a minimum of 2 feet above the perforated screening of the casing. Measure placement of sand with a tag line to ensure property placement. The silica sand or filter pack should be sized based on the screen slot size and aquifer characteristics.
- Above the filter pack the well must be sealed with bentonite to a minimum thickness of 3 feet from ground surface, and hydrated with clean, potable water. Backfill remaining well annulus with bentonite slurry (cement grout with bentonite) or grout to the ground surface.
- Develop the well (SOP-17) prior to collecting groundwater samples (SOP-12).
- Place locking protective well monument (stick-up or flush-mount) over well casing(s) after outer steel casing has been removed from the borehole. Grout cover in place and lock with high quality lock.
- Mark groundwater depth measuring point on north side of well casing with permanent marker.
- Well location and top of casing elevation should be surveyed to 0.01 ft.

BOREHOLE ABANDONMENT IN EVENT WELL CANNOT BE COMPLETED

• If for some reasons attempts to install a well fail, the borehole must be properly abandoned. To abandon a borehole, bentonite pellets or bentonite grout or slurry should be introduced into the borehole as the auger flights or well casing is extracted. If bentonite pellets are used, at periodic intervals of not less the every 3 feet of casing extraction, the bentonite should be hydrated with potable water. Bentonite pellets or slurry should be placed in the boreole to ground surface.



FIELD SCREENING OF VOLATILE ORGANIC COMPOUNDS IN SOIL

- Field screening can be done using a flame ionization detector (FID), photoionization detector (PID), or combustible gas indicator (GCI). Which instrument is used will depend on the contaminants at the site and site conditions. The Field Sampling Plan (FSP) should be reviewed to identify the field screening instrument to be used at the site.
- If using a PID, ensure the instrument is equipped with the appropriate lamp for the compound(s) of interest (refer to table below). Use a filter to prevent moisture and dust from contacting the PID lamp.
- Calibrate the instrument prior to each field day following the manufacturer's instructions. Document the calibration on the appropriate field form or in the project field book.
- Obtain a soil sample from the interval of interest, place it in a new ziploc bag, and seal the bag. Shake the bag to thoroughly mix the sample with the air in the headspace.
- Allow the sample to come to room temperature (approximately 70 - 80° F) by placing it in a warm location (not in direct sunlight). In the winter, it may be necessary to place the sample bag under a vehicle heater vent.
- Insert the probe in the ziploc bag and record the maximum reading on the appropriate field forms.

Purpose

Provide guidelines for field screening of volatile organic compounds in soil

Goal and Objective

To employ a standard method of measuring the concentration of volatile organics in soil

Equipment Needs

FID, PID, or GCI, as required by FSP Ink Pen Zip Lock Bags Latex or Nitrile gloves Field Log Book and Sampling Forms

Lamp	Description Typical Compounds Detected			
9.8 eV	Most selective lamp Benzene, aromatic compounds, amines			
10.6 eV	Standard PID lamp	All compounds detected by 9.8 eV lamp and chlorinated compounds, including vinyl chloride, DCE, TCE, PCE, and chlorobenzene		
11.7 eV	Detects broadest range of analytes	All compounds detected by 10.6 eV lamp, used to detect methylene chloride, carbon tetrachloride, chloroform, 1,1,1-trichloroethane		

PID Lamp Selection

SOP-17

MONITORING WELL DEVELOPMENT

FIELD PROCEDURE

After well installation and prior to sampling of a monitoring well, the well must be developed to remove excess fines and set the filter pack installed during well construction. Multiple techniques exist for development of a well, but the goal should be to extract enough groundwater from the well until clean (non-turbid) water is produced from the well. General steps to well development are discussed below.

- Visually inspect all well development equipment for damage and repair, as necessary.
- Decontaminate all stingers, air hoses, surge blocks that will be placed downhole following SOP-2.
- Generally a minimum of ten casing volumes is needed to properly develop a well. A well is considered developed when field parameters (pH, temperature and conductivity) have stabilized and the turbidity has dropped below 10 NTU.
- Turbidity readings and field parameters should be recorded periodically throughout the development process. Clarity of water (turbidity and color) after development and volume of water removed during development of the well should be recorded on well development forms (SOP-1).
- Report field observations on well development form including:
 - I. Volume of water removed during purge
 - 2. Date and time (duration) of development
 - 3. Depth to water, pre and post development
 - 4. Pumping depth
 - 5. Yield and field parameters collected at set time intervals.
- Evacuated water should be disposed of following to the process defined in the FSP for derived wastes and may need to be treated as investigation derived wastes (SOP-21).

PURGING UTILIZING DRILLING EQUIPMENT-COMPRESSED AIR

• If using a compressed air method for well development, verify the compressor utilized does not produce air laden with hydraulic fluid for lubricating purposes. This may affect the integrity of the monitoring well for producing viable water quality data.

Purpose

Provide guidelines for developing monitoring wells

Goal and Objective

To ensure wells are sufficiently developed prior to sampling

Equipment Needs

Decontamination equipment and fluids

Latex or Nitrile gloves Well Development Form Multi parameter meters Surge block/bailer/pump Air compressor/air line





SURGING AND PUMP TECHNIQUES

• Monitoring wells can be effectively developed using surging and pump techniques. A surge block or bailer is commonly used to remove entrained sediment and set the well casing followed by evacuation of water and sediment using a pump or bailer. To employ this method, place the surge block or bailer in the well and lower to bottom. Move the surge block or bailer up and down over the entire length of the well screen several times. Remove the surge block and bailer and evacuate water from the well. Repeat this procedure until evacuated water is visibly clean and free of sediment.

SOP-24

QUALITY CONTROL SAMPLING

Quality Control (QC) samples are submitted along with natural samples to provide supporting laboratory data to validate laboratory results. QC field samples are submitted blind to the laboratory with the exception of trip blanks. In general, field equipment blanks and duplicate

samples should be collected during every sampling event. Duplicate samples should be collected at a frequency of one sample for every 20 natural samples. Check the project-specific work plan before going to the field to determine what QC samples are required for the sampling event, and at what frequency QC samples should be collected.

With the exception of trip blanks, QC samples are prepared in the field. Trip blanks are supplied by the laboratory and will accompany each sample cooler containing samples for analysis of volatile organic compounds (VOC). Trip blanks provide data to evaluate whether the samples were affected by organic compounds during transport to the laboratory. Matrix spike and matrix spike duplicates (MS/MSD) are generated by submitting three duplicate samples from the same sample to the laboratory. The laboratory spikes two of the three samples with known concentrations of select target compounds, and all three are analyzed to evaluate the accuracy of the analysis.

Purpose

Outline the quality control samples to be collected in the field

Goal and Objective

To ensure quality control samples are collected along with natural samples to validate laboratory results

Equipment Needs

Field Forms and Field Book Chain-of-Custody Forms

	Most Common Quality Control Samples				
SP	Split Sample	A portion of a natural sample collected for independent analysis; used in calculating laboratory precision			
D	Duplicate Sample	Two samples taken from the same media under similar conditions; also used to calculate precision			
FB	Field Blank	Deionized water collected in sample bottle; used to detect contamination introduced during the sampling process.			
RB	Rinsate Blank	Deionized water run through or over decontaminated equipment; used to verify the effectiveness of equipment decontamination procedures			
MS/MSD	Matrix Spike/ Matrix Spike Duplicate	Certified materials of known concentration; used to assess laboratory precision and accuracy			
тв	Trip Blank	Inert material (deionized water or diatomaceous earth) included in sample cooler; sent by the lab, the sample is used to detect any contamination or cross-contamination during handling and transportation.			

The most common QC samples are shown in the table below:



QC sample collection frequencies are presented in the table below. Each field crew leader will be responsible for all QC samples prepared by that crew.

QC Sample	Purpose	Collection Frequency
Field Duplicate	Measure analytical precision.	l per every 20 samples
Matrix Spike/Matrix Spike Duplicate	Measure analytical accuracy.	l per every 20 samples
Equipment Rinse Blanks	Evaluate effectiveness of equipment decontamination and sample handling procedures.	l per sampling event per media
Field Blank	Assess possible cross- contamination of samples due to ambient conditions during sample collection.	I per sampling event
Trip Blanks	Evaluate sample preservation, packing, shipping, and storage.	l per sampling event with volatile constituents

SOP-25

MANAGEMENT OF INVESTIGATIVE-DERIVED WASTE

Prior to the field sampling event, review the project-specific work plan to understand how wastes generated during the investigation should be handled. This SOP is applicable to non-hazardous wastes. If hazardous wastes may be generated, consult with the project manager.

SOIL

Whenever possible, soil excavated from test pits should be placed back in the test pit in the reverse order that it was excavated.

To determine appropriate method for handing drill cuttings from soil borings or monitoring well installation, soil exhumed from the borehole should be monitored for staining and field screened for volatile organic compounds (VOCs) using a photoionization detector (PID) in accordance with SOP-17. Based on the PID screening, cuttings with VOC concentrations greater than 100 parts per million (ppm) should be containerized in labeled 55gallon drums (or roll-off containers if large volumes of cuttings are anticipated), pending further characterization. Alternatively, project personnel may elect to containerize all drill cuttings based on the presence of known contamination and contaminant concentrations. Containerized soil must be disposed in accordance with state and federal regulations based on soil analytical results.

Soil that does not appear to be contaminated based on observations by field personnel and PID screening may be spread on the ground near the point of origin.

GROUNDWATER

Groundwater purged from a well during development or sampling that has a sheen or contains free product must be containerized in an appropriately labeled 55-gallon drum or tank pending receipt of analytical results. A drum should be dedicated to each well sampled so that analytical results of the groundwater sample can be used to characterize the water in the drum. If groundwater from several wells is placed in a drum, the water in the drum should be sampled for adequate characterization. The containerized water must be disposed in accordance with state and federal regulations based on the analytical results. Groundwater that does not have a sheen or does not contain free product may be discharged to the ground surface.

Purpose

Outline the procedure for handling wastes generated during site investigation

Goal and Objective

To employ a method for appropriate handling investigative-derived wastes that limits contamination of the environment

Equipment Needs

Field Forms and Field Book DOT Approved 55-gallon Drums

Drum Wrench

SOP-36

INCIDENT/ACCIDENT INVESTIGATION AND REPORTING

This guideline establishes procedures for NewFields personnel on the reporting of work related injuries and illnesses and near miss incidents. It applies to all work related injuries and illnesses which occur to NewFields employees at all NewFields locations or field sites. Near miss incidents may be reported for prevention purposes.

DEFINITIONS

Injury or Illness - An injury or illness is an abnormal condition or disorder. Injuries include cases such as, but not limited to, a cut, fracture, sprain, or amputation. Illnesses include both acute and chronic illnesses, such as, but not limited to, a skin disease, respiratory disorder, or poisoning. (Note: Injuries and illnesses are OSHA recordable only if they are new, work-related cases that meet one or more of the 29 CFR 1904 recording criteria.)

Near Miss – A near miss is an incident that could have caused employee injury or illness, but did not. It may or may not have caused property damage. Near misses are used to implement control methods for preventing future occurrences.

Physician or Other Licensed Health Care Professional - A physician or other licensed health care professional is an individual whose legally permitted scope of practice (i.e., license, registration, or certification) allows him or her to independently perform, or be delegated the responsibility to perform, the activities required.

Purpose

To provide procedures for NewFields personnel on the reporting of work related injuries and illnesses and near miss incidents.

Goal and Objective

To provide a record of our work related injuries, illnesses and near miss incidents.

Equipment Needs

RESPONSIBILITIES

Human Resources Director (HR) – The HR is responsible for periodic review of the guidelines in this policy. HR is responsible for referring employees for non-emergency medical treatment, maintaining records related to injuries and illnesses that occur from occupational causes, and filing required reports with the Workers Compensation Insurance carrier. HR will maintain any required OSHA 300 logs and will provide information on accidents and near miss incidents to the HSC for prevention of similar incidents.

Project Principles (PP) - PP are responsible for reporting work related injuries and illnesses at all NewFields field sites and office locations. The PP is responsible for investigation of accidents and near misses for their projects and for implementing control methods needed to prevent recurrence of the incident.



Office Health and Safety Coordinator (HSC) – The HSC will provide assistance in investigation of accidents and near misses and will provide information to their offices regarding incident experience of other NewFields groups.

Employees – Employees are responsible for reporting all work related injuries and/or illnesses immediately to their direct supervisor or the PP. Employees will assist in the completion of required reports and investigations of accidents. Employees will also report near miss incidents to the PP so that an investigation can be completed to implement controls to prevent recurrence of the incident.

GUIDELINES

Accident Response

- I. Employees must report any incidents or near misses immediately to the PP and the HSC.
- 2. If medical attention is required, the employee is to follow the guidelines listed in SOP #8 (Emergency Action Plan) or site-specific HASP for the nearest medical facility or call 911 for emergency medical personnel.
- 3. Unless federal, state or local laws require differently, the PP will complete an "Incident Report" (Appendix A or equivalent) within 24 hours for each injury or illness to personnel or accidental damage to property. Vehicular accidents will be reported for company vehicles and personal vehicles used for business if the accident occurred during company business. For vehicular incidents, a copy of the police report must be attached.
- 4. A copy of the written report will be sent immediately to the Human Resources Director (HR)
- 5. The HR will notify the appropriate insurance company. Injuries and illnesses will be reported to the Workers Compensation insurance carrier, vehicular accidents will be reported to the vehicle insurance carrier. The owner of a personal vehicle will report an accident to their personal auto insurance carrier.

Near Misses

Near misses should be reported in the same manner as an accident using the "Incident Report Form" in Appendix A. While near misses will not be reported to the insurance carrier, they are valuable in the prevention of injuries. Employees may complete the report form and provide a copy to the PP and HSC. The PP will investigate the incident and determine appropriate control measures with the assistance of the HSC. The PP will document the corrective action taken on the incident form, or by memo and forward a copy to HR. HR will provide appropriate information to other HSC to improve prevention of similar accidents.

Incident Investigation

The PP should investigate all incidents and near misses for the root causes and to identify appropriate corrective actions. Responsibilities should be assigned for each corrective action as well as target dates for completion. Completed corrective action will be documented and the forwarded to the Human Resources Director.



Reporting of a Catastrophe or Fatality

OSHA requires that the employer verbally report by phone any occupationally caused fatality (except vehicular or public/commercial transportation) and any single incident that results in the hospitalization of three or more individuals (catastrophe) within 8 hours of receiving the information. This includes any fatality or hospitalization of three or more individuals up to 30 days after the initial incident. Any fatality or catastrophe will be reported as soon as possible to the PP. NewFields Management will report such incidents to OSHA when required.

REFERENCE

29 CFR 1904

APPENDIX A - INCIDENT REPORT FORM

	ablingRestricted DutyRecordableFirst Aid ageAir EmissionSpillNear Miss Other
Home Address	
Location of Incident: Length of service with company years Time spent on present job	months
Task being performed (Brief descri	ption of the task being performed and equipment used.)
MEDICAL INFORMATION/ IN	JURY CLASSIFICATION
Medical Treatment - Where:	

If employee is placed on restricted duty, provide de	etails of the restriction.
--	----------------------------

f employee is hospitalized provide the name and address of the h	ospital.
DESCRIBE INCIDENT (What was the work assignment; nature of	the incident; result of the incident?)
WHAT HAPPENED? (Tell exactly what happened; give exact lo	ocation.)
WHY DID IT HAPPEN? (What were the contributing factors, re	oot causes?)
DESCRIBE CORRECTIVE ACTIONS TAKEN	
Employee Signature	Date
Project Manager Signature	Date
	Date

SOP-38

EMERGENCY ACTION PLAN

This purpose of this Emergency Action Plan is to establish guidelines for NewFields employees to respond to emergencies. This SOP applies to NewFields office and field locations. Subcontractors are required to develop their own Emergency Action Plan and to coordinate their plan with NewFields' SOP.

DEFINITIONS

- <u>AED</u> Automated External Defibrillator is life saving equipment that is used to shock the heart into proper rhythm.
- <u>Clean-up Operation</u> An operation where hazardous substances are removed, contained, or cleaned up with the goal of minimizing the impact to people and the environment.
- <u>Decontamination</u> A process involving the removal of hazardous substances through physical means or neutralization.
- <u>Employee Alarm System</u> A verbal or audible method of alerting personnel of an emergency situation.
- <u>Hazardous Material Emergency Response</u> A response effort by employees from outside the immediate release area or by other designated responders, to an occurrence which results, or is likely to result in an uncontrolled release of a hazardous substance.

RESPONSIBILITIES

- Human Resources Director (HR) HR will review reports of emergency incidents and will update this SOP as needed.
- Project Principal The PP is responsible for providing appropriate resources in personnel and equipment required to complete the operations safely. They are also responsible for making available required training to affected employees. The PP is responsible for determining that an appropriate Emergency Action Plan is in operation at all NewFields field sites and that NewFields employees have been properly trained in the requirements of the plan. They are responsible for initiating evacuation or other response and making notifications as needed.

Purpose

To establish guidelines for NewFields employees to respond to emergencies.

Goal and Objective

The Emergency Action Plan addresses potential emergencies that could be reasonably expected on a site. This SOP applies to NewFields' offices and field locations.

Equipment Needs

- Fire extinguishers suitable for extinguishing ABC class fires
- First aid kit/Bloodborne
 pathogens kit
- CPR kit
- Self contained eye wash tank (when potential for eye contact exists)
- Personal Protective
 Equipment
- Air horns or equivalent signal device



- Health and Safety Coordinator (HSC) –The HSC has the responsibility for the development and implementation of a site specific Emergency Action Plan for each office location in compliance with this SOP. They are responsible for initiating or coordinating evacuation drills for their sites.
- Employees All employees will observe all emergency procedures appropriate to the site. In the event of an evacuation, employees are to follow the instructions provided by the PP/HSC and proceed to the muster point.

GUIDELINES

• Emergency situations can be characterized as a fire, explosion, serious weather condition, a hazardous environmental release, or accident with injury to personnel.

Emergency Action Planning

Each NewFields office and field site must have an Emergency Action Plan in place and the plan must be communicated to all employees on the site. The Emergency Action Plan must address potential emergencies that could be reasonably expected on a site. The Emergency Action Plan includes the following:

- Reasonably anticipated emergencies and the actions required by employees
- Evacuation procedures and designated emergency escape routes and muster points (Appendix A)
- Duties and procedures for NewFields employees
- Procedures to account for all employees after emergency evacuation has been completed
- Emergency rescue procedures including emergency phone numbers, contact people and routes of entry for emergency vehicles
- A chain of command list, including each person's name, title and phone number
- •n employee alarm system
- Evacuation drills

Types of Emergencies

There are a wide variety of potential emergency situations that may occur on any site. These should all be considered when completing the initial H&S Checklist or site-specific HASP for a field site. However, emergencies can also happen at office locations. They can include, but are not limited to:

- Fire
- Explosion
- Chemical Release
- Medical Emergency
- Bomb Threat
- Severe Weather



- Civil Disturbance
- Workplace Violence
- Terrorist Action

Preplanning and practice for emergencies help to prevent or reduce injury and damage in these situations.

Emergency Notification Procedures

The PP is responsible for any emergency notifications required. These notifications may involve emergency response agencies, other organizations on the site, and regulatory agencies.

When notifying outside emergency response agencies of the emergency, it is important to assure the rapid and accurate transfer of information to appropriate personnel. When calling the police, fire department, or medical emergency personnel, the following information should be provided to the dispatcher:

- Caller's full name
- The nature of the incident (i.e. "Fire")
- The location of the incident (i.e. "Street location and nearest intersection"). The more specific the better.
- What you need (i.e. "Fire Department and First Aid").
- If you are able, where you will meet emergency responders (i.e. at end of West Street, near train tracks).
- If applicable, a call back number or your pager number (e.g. "I'll be at the scene; my pager number is 123-4567").
- Status of the situation (e.g., is the situation stabilized or "I have the fire under control").
- If anyone is injured or in need of emergency assistance (e.g. "A mechanic working on a pump was burned.").

Additional regulatory agencies may need to be notified during or after the emergency, such as EPA for a hazardous material spill, or OSHA for a fatality. Consult with the PP and HR before calling these agencies to maintain compliance with the regulations.

Reporting

NewFields PP and Human Resources will be notified when:

- Any employee, contractor, or third party employee suffers a fatality or serious occupational injury or illness. Serious injuries or illnesses include those that involve amputation, crushing injury, hospitalization, or work-related toxic material exposure, even if no lost workdays are experienced. Transportation incidents will be reported if the person was on Company business.
- 2. Damage from fires, explosions or a natural disaster in excess of US \$50,000 occurs to Company buildings or equipment.

- 3. Regulatory inspections, notices, citations, orders, or requests for information involving occupational health, safety or environmental issues alleged non-compliance with laws, regulations, permits, licenses, etc. civil liability, criminal liability, or that work conditions endanger the lives or health and safety of employees, contractors, or the community.
- 4. Spills or releases of hazardous substances may require governmental agency notification.
- 5. Legal action regarding an occupational health, safety or environmental issue is being taken or is threatened by any party, including public and private entities.

Measures to Review and Follow-up Incident Reports

For any emergencies that occur at a NewFields site, the PP or HSC will provide a report to HR describing the following:

- The event (including date and time) that necessitated the response and the basis for that decision
- Date, time, and names of all persons/agencies notified and their response.
- Resolution of the incident (including duration) and the method/corrective action involved.

This report will be reviewed by HR to determine if changes to this SOP are needed.

Personnel Injury

Personnel injury may occur at any location, and medical treatment may range from first aid to life-saving techniques. If medical attention is needed an ambulance/rescue squad should be contacted for transport, in most cases. Some situations may require transport of an injured party by company personnel. The nearest hospital and driving directions for the hospital route are located in the site-specific HASP or site Emergency Action Plan. Please refer to SOP #12 First Aid and CPR and SOP # 17 Incident/Accident Reporting and Investigation.

Evacuation

In most emergency situations all personnel will evacuate the building or area and assemble at their designated muster point. Each office and field location will have a written evacuation plan (Appendix A) that includes an employee signal and appropriate muster points for personnel to meet outside the building/area and a map of exit routes. Many municipalities require an exit route map to be posted in the employee areas.

Designated personnel will be responsible for accounting for personnel at muster points. No unauthorized person will be allowed back into the area/building once the emergency signal has been given.

Employees

New employee orientation will include review of emergency procedures. New employees will be briefed on alarm signals, appropriate responses to the signals, lines of authority, evacuation routes and muster points.



Initial field site briefings will include emergencies procedures, alarm signals and the designation of the safe refuge during a site evacuation. All employees are required to gather at the designated refuge site after hearing the emergency signal.

Subcontractors

Subcontractors working on NewFields project sites will identify the appropriate refuge for their workers. Each subcontractor will identify one person to account for their personnel and report their status.

Drills

All locations will conduct evacuation drills at least annually. These drills may be scheduled. Drills must include the sounding of appropriate alarms, evacuation of all personnel, accounting for personnel at muster points, and evaluation of drill effectiveness. Any deficiencies should be noted in a report to the HR and improvements should be made to the location's evacuation drill.

Fire Fighting Procedures

When a fire is detected, the fire department will be contacted immediately by activating the office alarm system or calling 911 (see Emergency Notification 5.2). A fire extinguisher meeting the requirements of 29 CFR Part 1910 Subpart L, as a minimum, will be accessible to control small incipient fires. Appropriate fire extinguishers will be located in each office area and all company vehicles. Only personnel with appropriate training in the use of fire extinguishers should use this equipment. NewFields employees are not expected to fight fires.

Chemicals Releases

Releases may involve gases, liquid, or solids. The release area should be blocked off to avoid the spread of the spilled material and contact with personnel, equipment or vehicles. Minor chemical spills may be cleaned up utilizing the appropriate absorbent material. The location of any spill clean up equipment will be included in the initial site briefing. Only trained and qualified personnel may address a large spill or one of a highly toxic nature. Therefore, if a large spill or one of a highly toxic nature occurs, all NewFields personnel will evacuate the area and the Emergency Response personnel will be notified.

Severe Weather Conditions

Severe weather conditions may include, snow storms, blizzards, hurricanes, tornados, lightning, thunderstorms, high winds and heavy rain. Severe weather may cause significant hazards for field operations, depending on the tasks being performed and the available shelter. In some cases, severe weather may affect the safety of personnel in office locations as well. It is the responsibility of the PP to determine when work will cease and employees should proceed to shelter.

If severe weather conditions are expected, the following should be considered prior to work initiation:

• Check the extended forecast for the work area to prepare for possible severe weather situations.



- Coordinate with the local authorities to determine safe areas or public storm shelters that can be used in an emergency.
- For additional information, use an AM/FM radio, NOAA Weather Radio or telephone to get updated information on storms in the area.
- Contact the local National Weather Service office or American Red Cross chapter for updates on storm conditions.
- Keep a lookout for signs of approaching severe weather, such as increasing wind, flashes of lightning and sound of thunder.

If serious weather conditions develop, operations should stop and personnel should proceed to designated shelters.

Emergency Equipment

NewFields office locations will maintain, at a minimum:

- Fire extinguishers suitable for extinguishing ABC class fires
- First aid kit/Bloodborne pathogens kit
- CPR kit

NewFields field sites will maintain the following equipment for safety and emergency response purposes:

- Fire extinguisher
- First aid kit/ Bloodborne pathogens kit
- Self contained eye wash tank (when potential for eye contact exists)
- Personal Protective Equipment
- Air horns or equivalent signal device

Emergency Communications

Cellular phones will be used for NewFields field sites and office locations without paging systems for emergency communications.

TRAINING

All NewFields employees will receive, at a minimum, Emergency Awareness training during orientation. Additional training will be completed whenever a change in the Emergency Action Plan or Evacuation Plan occurs. All NewFields employees at field sites will be provided site- specific emergency procedures during the initial briefing for the project and whenever there is a change. Training will be documented and will include:

- Employee alarm
- Evacuation Procedures
- Muster points
- Emergency recognition and response

REFERENCES

29 CFR 1910.120 or 1926.65 Hazardous Waste Operations and Emergency Response 29 CFR 1910.39 Emergency Action Plans

APPENDIX & - SITE SPECIFIC EMERGENCY	Y EVACUATION PLAN
Location:	Date:
Prepared by:	
Emergency Coordinator:	
Emergency Phone Numbers:	
Employee Alarm System (describe sound/light):	
Evacuation Plan:	
Muster Locations (including those responsible for he	adco unts):
Exit route maps are attached.	



Site Name: LUCIER_DICK

15400 Marcure Lane

Section 7: Well Test Data

MONTANA WELL LOG REPORT

This well log reports the activities of a licensed Montana well driller, serves as the official record of work done within the borehole and casing, and describes the amount of water encountered. This report is compiled electronically from the contents of the Ground Water Information Center (GWIC) database for this site. Acquiring water rights is the well owner's responsibility and is NOT accomplished by the filing of this report.

Other Options

<u>Go to GWIC website</u> <u>Plot this site in State Library Digital Atlas</u> <u>Plot this site in Google Maps</u> <u>View scanned well log (9/10/2012 12:42:25 PM)</u>

Site Name: LUCIER, DIC GWIC Id: 267951	К			Section 7: Well Test Data		
Section 1: Well Owner(s 1) LUCIER, DICK (MAIL))			Total Depth: 167 Static Water Level: -1 Water Temperature:		
				Air Te	st *	
2) LUCIER, DICK (WELL)				<u>40 gp</u>	m with	drill stem set at <u>160</u> feet for <u>2</u> hours.
				Time o Recov	of recov ery wat	rery <u>0.25</u> hours. ter level <u>-1</u> feet.
Section 2: Location	0	0		Pumpi	ng wat	er level _ feet.
Township Range 14N 21W	Section 2	Quarter Sec				
County	Z	SW¼ SE Geocode	74			vell test the discharge rate shall be as uniform as
MISSOULA		Geocode				s rate may or may not be the sustainable yield of the
Latitude	Longitude	Geomethod	Datum	casing		able yield does not include the reservoir of the well
46.99585167065 -1	14.2164290975	TRS-SEC	NAD83	casing	•	
Ground Surface Altitude	Ground Surfa	ace Method Da	atum Date	Sectio	n 8: R	emarks
Addition	Block	Lo	t	Sectio	n 9: W	ell Log
				Geolo	gic So	urce
Section 3: Proposed Use	e of Water			Unass	igned	
DOMESTIC (1)				From	То	Description
				0	2	SOIL
Section 4: Type of Work				2		GRAVEL, COBBLES, SAND
Drilling Method: ROTARY				24	135	SAND, LITTLE GRAVEL, CLAY
Status: NEW WELL				135	145	CLAY, GRAVEL, SAND
				145	161	SAND
Section 5: Well Complete		4 2011		161	167	GRAVEL, CLAY, SAND
Date well completed: Wednes	sday, December 14	4, 2011				
Section 6: Well Construct	ction Details					
Borehole dimensions						
0167 6 Casing						
Wall	Pressure					
From To Diameter Thickn	ness Rating Jo	int Type				
-2 167 6 0.25	W	ELDED STEEL				
Completion (Perf/Screen)				Driller	Certif	ication
# of	Size of					ormed and reported in this well log is in compliance with
From To Diameter Openin		-		the Montana well construction standards. This report is true to the best of my knowledge.		
167 167 6	0	PEN BOTTOM		Dest of		-
Annular Space (Seal/Grout/	- '			Name: RANDAL KOTECKI		
Cont				Company: JEROMES DRILLING CO		
From To Description Fed?	4			License No: WWC-600		
0 0 BENTONITE Y				Date (Comple	ted: 12/14/2011

15700 Marcure Lane

MONTANA WELL LOG REPORT

This well log reports the activities of a licensed Montana well driller, serves as the official record of work done within the borehole and casing, and describes the amount of water encountered. This report is compiled electronically from the contents of the Ground Water Information Center (GWIC) database for this site. Acquiring water rights is the well owner's responsibility and is NOT accomplished by the filing of this report.

Site Name: LUCIER DORRILLE & LENA GWIC Id: 71209

Section 1: Well Owner(s) 1) LUCIER, DORRILLE/LENA (MAIL)

Section 2: Location

Township	Range	Section	Quarter	Sections
14N	21W	2	SW1/2	SE1/4
(County		Geoco	ode
MISSOULA				
Latitude	Longi	tude	Geomethod	Datum
46.995852	-114.21	6429	TRS-SEC	NAD83
Ground Surfac	e Altitude	Ground S	urface Method	Datum Da

Addition Block

Section 3: Proposed Use of Water

DOMESTIC (1) STOCKWATER (2)

Section 4: Type of Work

Drilling Method: Status: NEW WELL

Section 5: Well Completion Date

Date well completed: Wednesday, February 19, 1941

Section 6: Well Construction Details

There are no borehole dimensions assigned to this well. Casing

			Wall	Pressure		
From	То	Diameter	Thickness	Rating	Joint	Туре
0	154	6				STEEL

There are no completion records assigned to this well. Annular Space (Seal/Grout/Packer)

There are no annular space records assigned to this well.

Other Options

<u>Go to GWIC website</u> <u>Plot this site in State Library Digital Atlas</u> <u>Plot this site in Google Maps</u> <u>View scanned well log (11/7/2008 3:05:01 PM)</u>

Section 7: Well Test Data

Total Depth: 154 Static Water Level: Water Temperature:

Unknown Test Method *

Yield <u>20</u> gpm. Pumping water level _ feet. Time of recovery _ hours. Recovery water level _ feet.

* During the well test the discharge rate shall be as uniform as
 possible. This rate may or may not be the sustainable yield of the
 ate well. Sustainable yield does not include the reservoir of the well casing.

Section 8: Remarks

I of

Section 9: Well Log Geologic Source 112ALVM - ALLUVIUM (PLEISTOCENE)

From		Description
0	130	QUICK SAND
130	154	HARD PAN AND GRAVEL

Driller Certification

All work performed and reported in this well log is in compliance with the Montana well construction standards. This report is true to the best of my knowledge.

Name: Company: License No: -Date Completed: 2/19/1941

15740 Marcure Lane

MONTANA WELL LOG REPORT

This well log reports the activities of a licensed Montana well driller, serves as the official record of work done within the borehole and casing, and describes the amount of water encountered. This report is compiled electronically from the contents of the Ground Water Information Center (GWIC) database for this site. Acquiring water rights is the well owner's responsibility and is NOT accomplished by the filing of this report.

Other Options

<u>Go to GWIC website</u> <u>Plot this site in State Library Digital Atlas</u> <u>Plot this site in Google Maps</u> <u>View hydrograph for this site</u> <u>View field visits for this site</u> <u>View scanned well log (11/7/2008 3:04:53 PM)</u>

Site Name: NIELSEN DENNIS & LISA GWIC Id: 122456

Section 1: Well Owner(s) 1) NIELSEN, DENNIS/LISA (MAIL)

2) NIELSEN, DENNIS/LISA (MAIL)

Section 2: Location

Township	Range	Section	Qu	arte	r Section	s
14N	21W	2	SE1/4	SW	1/4 SW1/4 S	E¼
	County			Ge	eocode	
MISSOULA						
Latitude	Longite	ude	Geometh	۱od		Datum
46.9938	-114.21	172	NAV-GF	PS	N	AD27
Ground Surfa	ce Altitude	Ground Su	urface Meth	ıod	Datum	Date
304	0					8/7/1999
Measuring Po	oint Altitude	MP Metho	d Datum		Date App	olies
304	1.1			8/7	/1999 5:1	5:00 PM
Addition		Bloc	k		Lot	

Section 3: Proposed Use of Water DOMESTIC (1)

Section 4: Type of Work

Drilling Method: ROTARY Status: NEW WELL

Section 5: Well Completion Date

Date well completed: Friday, April 12, 1991

Section 6: Well Construction Details

There are no borehole dimensions assigned to this well. Casing

			Wall		Pressu	re			
From	То	Diameter	Thickr	ness	Rating		Joint	Туре	
-2	160	6						STEEL	
Comp	Completion (Perf/Screen)								
			# of	Si	ze of				
From	То	Diameter	Openin	gs O	penings	De	scripti	on	
160	160	6				OF	PEN BO	* MOTTO	
Annul	ar Sp	bace (Seal	/Grout/F	acke	r)				
			Cont.						
From	То [Descriptio	n Fed?						
0	20 E	BENTONIT	E						

Section 7: Well Test Data

Total Depth: 160 Static Water Level: 25 Water Temperature:

Air Test *

<u>60</u> gpm with drill stem set at _ feet for <u>3</u> hours. Time of recovery _ hours. Recovery water level _ feet. Pumping water level <u>45</u> feet.

* During the well test the discharge rate shall be as uniform as possible. This rate may or may not be the sustainable yield of the well. Sustainable yield does not include the reservoir of the well casing.

Section 8: Remarks

JEROMES FILE NO: 3280

Section 9: Well Log

Geologic Source

112ALVM - ALLUVIUM (PLEISTOCENE)

From	То	Description
0		SOIL
4		SAND
10		SAND GRAVEL
35	150	CLAY SAND SATURATED
150	160	GRAVEL WITH WATER

Driller Certification

All work performed and reported in this well log is in compliance with the Montana well construction standards. This report is true to the best of my knowledge.

Name: Company: JEROMES DRILLING CO License No: WWC-249 Date Completed: 4/12/1991

15762 Marcure Lane

		MON		ELL LOG RE	PORT			Other Options
official reco amount of contents of	ord of work water enco f the Groun vater right	k done wit ountered. nd Water is is the we	hin the bo This repo Informatio	rehole and c rt is compileo n Center (G\	ana well driller, asing, and des d electronically NIC) database ty and is NOT	from the for this	ne e site.	<u>Go to GWIC website</u> <u>Plot this site in State Library Digital Atlas</u> <u>Plot this site in Google Maps</u> <u>View scanned well log (11/7/2008 3:05:18 PM)</u> by
Site Name: GWIC Id: 1		SON DEE	BIE LUC	IER		Sectio	n 7: W	ell Test Data
Section 1: 1) STENER	Well Own	• •	IL)			Water	Nater I Tempe	_evel: 18
						Bailer	Test *	
Section 2: Townshi 14N	p Rai	w	ection 2	-	Sections W¼ SE¼ code	Time o Recov	f recov ery wat	_feet of drawdown after <u>2</u> hours. ery _ hours. er level _ feet. er level <u>38</u> feet.
MISSOULA Latitude 46.99493 Ground Se		Longitude -114.21780 tude G	5	Geomethod TRS-SEC face Method	Datum NAD83 Datum Date	possib	le. This ustaina	vell test the discharge rate shall be as uniform as s rate may or may not be the sustainable yield of the able yield does not include the reservoir of the well
Addition			Block		Lot	Sectio	n 8: R	emarks
Section 3: DOMESTIC (Section 4:	(1)		Vater			Geolo 112AL	gic So /M - A	LLUVIUM (PLEISTOCENE)
Drilling Metho	od: CABLE					From		Description
Status: NEW	WELL					0		TOPSOIL SAND GRAVEL AND CLAY
Section 5:		•				25		SILTY SAND CLAY AND WATER
Date well cor	npleted: Sa	turday, Oct	tober 10, 19	992		142		CLAY
Section 6: There are no) this well.		154	158.5	SAND GRAVEL AND WATER
Casing		Wall	Pressu	re				
From To	Diameter	Thicknes	ss Rating	Joint Ty				
-1.5 158.5				SI	EEL			
Completion		en) # of	Size of					
		Openings	Openings	Description				
158.5 158.5				OPEN BOTT	OM *			
Annular Spa			er)			Driller	Cortifi	cation
From To De		Cont. Fed2						rmed and reported in this well log is in compliance with
								well construction standards. This report is true to the
								owledge.

best of my knowledge. Name: Company: CKC License No: WWC-185 Date Completed: 10/10/1992

Car Wash Well

MONTANA WELL LOG REPORT

This well log reports the activities of a licensed Montana well driller, serves as the official record of work done within the borehole and casing, and describes the amount of water encountered. This report is compiled electronically from the contents of the Ground Water Information Center (GWIC) database for this site. Acquiring water rights is the well owner's responsibility and is NOT accomplished by the filing of this report.

Other Options

<u>Go to GWIC website</u> <u>Plot this site in State Library Digital Atlas</u> <u>Plot this site in Google Maps</u> <u>View scanned well log (11/7/2008 3:57:43 PM)</u>

-									
Site Name: HO GWIC Id: 71240		LDOR	۶F				Sectio	on 7: W	/ell Test Data
DNRC Water Ri		0					Total D		154 Level: 28
Section 1: Well	Owner(s))							erature:
1) HOERNER, V			_)						
DRAWER D	50000 100		701				Air Te	Stî	
MISSOULA MT	29806 [06	/10/19	79]				100 0	ınm wit	th drill stem set at _ feet for <u>3</u> hours.
Section 2: Loca	otion								/ery _ hours.
Township	Range	50	ction	0.	iortor S	ections			ter level _ feet.
14N	21W		24			1/4 NE1/4	Pumpi	ng wat	er level <u>38</u> feet.
	county		24		Geoco				
MISSOULA	Jounty				00000		* D		
Latitude	Lond	gitude		Geomet	hod	Datum			well test the discharge rate shall be as uniform as s rate may or may not be the sustainable yield of the
46,964106		, 197179		TRS-S		NAD83			able yield does not include the reservoir of the well
Ground Surfac	e Altitude	Gr	ound Sur	face Me	thod	Datum Date	casing		
							e a eg		
Addition			Block			Lot	Sectio	n 8: R	emarks
							Sectio	on 9: W	/ell Log
Section 3: Prop		e of Wa	ater				Geolo	gic So	urce
COMMERCIAL (1)						112AL	VM - A	LLUVIUM (PLEISTOCENE)
Section 4: Type	of Work							То	Description
Drilling Method: C							0	8	TOPSOIL
Status: NEW WEL							8		SAND GRAVEL AND CLAY
							32		SILTY SAND AND CLAY
Section 5: Well	Completi	ion Da	te				148		SAND GRAVEL AND WATER
Date well complete	ed: Sunday	, June 1	10, 1979						
Section 6: Well									
There are no bore	hole dimen	sions a	ssigned to	o this we	II.				
Casing	har n		-	-		7			
From To Diam	Wall eter Thick		Pressure		Tuna				
		ness	Rating	Joint		_			
-2 154 6	(0)				STEEL				
Completion (Perf	# of		ze of			Т			
From To Diame		-		Descripti	ion				
154 154 6		igs op	-	OPEN BO		*			
Annular Space (S						_	Drillor	l Cortif	ication
Annular Space (3	seal/Grout/	Packer)						prmed and reported in this well log is in compliance with
There are no annu	ılar space r	ecords	assigned	to this w	ell.				well construction standards. This report is true to the
									iowledge.
								Na	ime:
								Compa	any: CKC
							L		No: WWC-185

Date Completed: 6/10/1979

Cartage Building Well

MONTANA WELL LOG REPORT

This well log reports the activities of a licensed Montana well driller, serves as the official record of work done within the borehole and casing, and describes the amount of water encountered. This report is compiled electronically from the contents of the Ground Water Information Center (GWIC) database for this site. Acquiring water rights is the well owner's responsibility and is NOT accomplished by the filing of this report.

Other Options

Plot this site in State Library Digital Atlas Plot this site in Google Maps

Site Name: STONE CONTAINER GWIC Id: 706489

Section 1: Well Owner(s)

Section 2: Location

Township	Range	Section	Quarter	Sections	
14N	21W	24	NE¼ NW¼		
	County		Geoc	ode	
MISSOULA					
Latitude	Longitude		Geomethod	Dat	um
46.9633	-114.1988		MAP	NAD	027
Ground Surfa	ce Altitude	Ground S	Surface Method	Datum	Date
Addition		Block		Lot	

Section 3: Proposed Use of Water

UNUSED (1)

Section 4: Type of Work

Drilling Method: CABLE Status: NEW WELL

Section 5: Well Completion Date

Date well completed: Friday, January 1, 1960

Section 6: Well Construction Details

There are no borehole dimensions assigned to this well. **Casing**

From	То	Diameter	Wall Thickness	Pressure Rating	Joint	Туре
0	183	16				

There are no completion records assigned to this well. Annular Space (Seal/Grout/Packer)

There are no annular space records assigned to this well.

Section 7: Well Test Data

Total Depth: 183 Static Water Level: 21 Water Temperature:

Unknown Test Method *

Yield <u>1200</u> gpm. Pumping water level <u>35</u> feet. Time of recovery _ hours. Recovery water level _ feet.

* During the well test the discharge rate shall be as uniform as possible. This rate may or may not be the sustainable yield of the well. Sustainable yield does not include the reservoir of the well casing.

Section 8: Remarks

Section 9: Well Log Geologic Source 112ALVM - ALLUVIUM (PLEISTOCENE) Lithology Data

There are no lithologic details assigned to this well.

Driller Certification

All work performed and reported in this well log is in compliance with the Montana well construction standards. This report is true to the best of my knowledge.

Name: Company: License No: -Date Completed: 1/1/1960

Curtis Ranch House

MONTANA WELL LOG REPORT

This well log reports the activities of a licensed Montana well driller, serves as the official record of work done within the borehole and casing, and describes the amount of water encountered. This report is compiled electronically from the contents of the Ground Water Information Center (GWIC) database for this site. Acquiring water rights is the well owner's responsibility and is NOT accomplished by the filing of this report.

Other Options

<u>Go to GWIC website</u> <u>Plot this site in State Library Digital Atlas</u> <u>Plot this site in Google Maps</u>

Site Name: MARCURE ALLEN GWIC Id: 706475

Section 1: Well Owner(s)

Section 2: Location

Township	Range	Section	Quarter	Sections	
14N	21W	11	NE ¹ ⁄4	NW¼	
(County		Geoc	ode	
MISSOULA					
Latitude	Longitude		Geomethod	Date	um
46.9919	-114.22		MAP	NAC)27
Ground Surfac	e Altitude	Ground S	Surface Method	Datum	Date
3049)				
Addition		Block		Lot	

Section 3: Proposed Use of Water

DOMESTIC (1)

Section 4: Type of Work

Drilling Method: CABLE Status: NEW WELL

Section 5: Well Completion Date

Date well completed: Wednesday, January 1, 1941

Section 6: Well Construction Details

There are no borehole dimensions assigned to this well. **Casing**

			Wall	Pressure		
From	То	Diameter	Thickness	Rating	Joint	Туре
0	36	5				

There are no completion records assigned to this well. Annular Space (Seal/Grout/Packer)

There are no annular space records assigned to this well.

Section 7: Well Test Data

Total Depth: 36 Static Water Level: Water Temperature:

Unknown Test Method *

Yield _ gpm. Pumping water level _ feet. Time of recovery _ hours. Recovery water level _ feet.

* During the well test the discharge rate shall be as uniform as possible. This rate may or may not be the sustainable yield of the well. Sustainable yield does not include the reservoir of the well casing.

Section 8: Remarks

Section 9: Well Log Geologic Source 111ALVM - ALLUVIUM (HOLOCENE) Lithology Data

There are no lithologic details assigned to this well.

Driller Certification

All work performed and reported in this well log is in compliance with the Montana well construction standards. This report is true to the best of my knowledge.

Name: Company: License No: -Date Completed: 1/1/1941

Danforth Well

MONTANA WELL LOG REPORT

This well log reports the activities of a licensed Montana well driller, serves as the official record of work done within the borehole and casing, and describes the amount of water encountered. This report is compiled electronically from the contents of the Ground Water Information Center (GWIC) database for this site. Acquiring water rights is the well owner's responsibility and is NOT accomplished by the filing of this report.

Other Options

<u>Go to GWIC website</u> <u>Plot this site in State Library Digital Atlas</u> <u>Plot this site in Google Maps</u>

Site Name: DANFORTH W W GWIC Id: 706496

Section 1: Well Owner(s)

Section 2: Location

Township	Range	Section	Quarter	Sections	
14N	21W	25	SW1/4 NE1/4		
(County		Geocode		
MISSOULA					
Latitude	Longitude		Geomethod	Date	um
46.9452	-114.1936		MAP	NAE	027
Ground Surfac	ce Altitude	Ground S	Surface Method	Datum	Date
Addition		Block		Lot	

Section 3: Proposed Use of Water

DOMESTIC (1)

Section 4: Type of Work

Drilling Method: Status: NEW WELL

Section 5: Well Completion Date

Date well completed: Wednesday, January 1, 1958

Section 6: Well Construction Details

There are no borehole dimensions assigned to this well. **Casing**

Erom			Wall Thickness	Pressure	Joint	Tuna
From	10	Diameter	Thickness	Rating	Joint	туре
0	40	4				

There are no completion records assigned to this well. Annular Space (Seal/Grout/Packer)

There are no annular space records assigned to this well.

Section 7: Well Test Data

Total Depth: 40 Static Water Level: Water Temperature:

Unknown Test Method *

Yield _ gpm. Pumping water level _ feet. Time of recovery _ hours. Recovery water level _ feet.

* During the well test the discharge rate shall be as uniform as possible. This rate may or may not be the sustainable yield of the well. Sustainable yield does not include the reservoir of the well casing.

Section 8: Remarks

Section 9: Well Log Geologic Source 111ALVM - ALLUVIUM (HOLOCENE) Lithology Data

There are no lithologic details assigned to this well.

Driller Certification

All work performed and reported in this well log is in compliance with the Montana well construction standards. This report is true to the best of my knowledge.

Name: Company: License No: -Date Completed: 1/1/1958

Deep Well #1

MONTANA WELL LOG REPORT

This well log reports the activities of a licensed Montana well driller, serves as the official record of work done within the borehole and casing, and describes the amount of water encountered. This report is compiled electronically from the contents of the Ground Water Information Center (GWIC) database for this site. Acquiring water rights is the well owner's responsibility and is NOT accomplished by the filing of this report.

Other Options

<u>Go to GWIC website</u> <u>Plot this site in State Library Digital Atlas</u> <u>Plot this site in Google Maps</u> <u>View scanned well log (11/7/2008 3:59:19 PM)</u> <u>View scanned well log (11/7/2008 4:04:27 PM)</u>

Site Name: WAL COMPANY	DORF HOE	RNER PAF	PER PRODUC	CTS	Sectio	n 7: W	/ell Test Data	
GWIC Id: 71248					Total D	epth: 1	173	
						•	_evel: 22.8	
Section 1: Well C	Owner(s)				Water	Tempe	rature:	
1) WALDORF, HO	DERNER (M	AIL)			_			
N/A					Pump	Test *		
MISSOULA MT 5	9801 [04/10	/1957]			Donth		act for toot	
	•				Depth pump set for test _ feet. 2000 gpm pump rate with _ feet of drawdown after <u>8</u> hours of			
Section 2: Locat			. .		<u>2000 gpm pump rate with _ reet of drawdown after _o</u> nodis of pumping.			
Township	Range	Section		Sections	Time of recovery _ hours.			
14N	21W	24		NW1⁄4	Recovery water level _ feet.			
	ounty		Geoc	ode	Pumping water level 52 feet.			
MISSOULA Latitude	Longitu	do	Geomethod	Datum				
46,963184	Longitue -114.2011		TRS-SEC	NAD83				
Ground Surface			rface Method				vell test the discharge rate shall be as uniform as s rate may or may not be the sustainable yield of the	
Ground Gundee	Annuae		nace method	Datam Date			able yield does not include the reservoir of the well	
Addition		Block		Lot	casing			
					Sectio	n 8: R	emarks	
Section 3: Propo	sed Use of	Water						
INDUSTRIAL (1)					Sectio	n 9: W	lell Log	
					Geolo			
Section 4: Type of Work					112ALVM - ALLUVIUM (PLEISTOCENE)			
Drilling Method: CHURN						То	Description	
Status: NEW WELL					0		FILL DIRT AND GRAVEL	
Section 5: Well (Completion	Dato			7		GRAVEL AND WATER FROM 23 TO 26 FEET	
Section 5: Well Completion Date Date well completed: Wednesday, April 10, 1957			26		SANDY CLAY			
Date well completed	. Weanesday	, April 10, 1	551		95		SAND WITH VERY SMALL GRAVEL AND WATER	
Section 6: Well Construction Details			112		YELLOW CLAY			
There are no borehole dimensions assigned to this well.			118		SANDY CLAY			
Casing	-	-			132		SMALL GRAVEL SAND CLAY WITH WATER	
	Wall	Pressure			142		YELLOW CLAY	
From To Diamet	er Thickness	Rating	Joint Type		146		COARSE GRAVEL AND SAND WITH WATER	
-2 173 16					140		YELLOW CLAY AND GRAVEL	
Completion (Perf/S			1		169		CLAY GRAVEL AND BOULDERS	
	# of	Size of			100	202		
From To Diamete	er Openings	· ·						
147 168 16			3/8X3 KNIFE					
Annular Space (Seal/Grout/Packer)								
There are no annular space records assigned to this well.				Driller	Cortifi	ication		
					prmed and reported in this well log is in compliance with			
							well construction standards. This report is true to the	
							owledge.	

Name: Company: CAMP WELL DRILLING License No: WWC-7 Date Completed: 4/10/1957 5/15/2019

Deep Well #2

MONTANA WELL LOG REPORT

This well log reports the activities of a licensed Montana well driller, serves as the official record of work done within the borehole and casing, and describes the amount of water encountered. This report is compiled electronically from the contents of the Ground Water Information Center (GWIC) database for this site. Acquiring water rights is the well owner's responsibility and is NOT accomplished by the filing of this report.

Other Options

<u>Return to menu</u> <u>Plot this site in State Library Digital Atlas</u> <u>Plot this site in Google Maps</u> <u>View scanned well log (11/7/2008 4:00:28 PM)</u>

Site Name: W	ALDORF HC	DERNER PA	PER PRODUC	TS	Sectio	n 7: W	ell Test Data
GWIC Id: 712	50				Total D Static		74 .evel: 22
Section 1: We	ell Owner(s)				Water	Tempe	rature:
1) WALDORF	, HOERNER ((MAIL)			Pump	Test *	
MISSOULA M	IT 59801 [05/2	21/1957]					
Section 2: Lo	cation				2000	gpm p	set for test _ feet. ump rate with _ feet of drawdown after <u>8</u> hours of
Township	Range	Section	Quarter	Sections	pumpii Time o		ery _ hours.
14N	21W	24	NE¼	NW¼			ery _ nours. er level _ feet.
MISSOULA	County		Geoc	ode		•	er level <u>48</u> feet.
Latitude	Longi	tude	Geomethod	Datum			
46.963184	-114.20	01126	TRS-SEC	NAD83	* Durin	g the v	vell test the discharge rate shall be as uniform as
Ground Surf	ace Altitude	Ground S	urface Method	Datum Date	possib	le. This	rate may or may not be the sustainable yield of the able yield does not include the reservoir of the well
Addition		Block		Lot	casing		
					Sectio	n 8: Re	emarks
Section 3: Pr	-	of Water					
INDUSTRIAL (1)				Sectio	n 9: W	ell Log
0					Geolo	gic So	urce
Section 4: Ty	-				112AL	VM - Al	LUVIUM (PLEISTOCENE)
Drilling Method: Status: NEW W					From	То	Description
					0	7	TOPSOIL
Section 5: We	ell Completic	on Date			7	30	GRAVEL AND SAND SOME WATER 23 TO 30 FEET
Date well comp	leted: Tuesday,	May 21, 195	7		30	80	SANDY CLAY WITH SOME GRAVEL
					80	112	SANDY CLAY
Section 6: We					112	116	CLAY
There are no bo	orehole dimensi	ions assigned	to this well.		116	142	SANDY CLAY
Casing	Wall	Pressure			142	169	BIG GRAVEL SAND AND WATER
From To Dia			Joint Type		169	174	CLAY GRAVEL AND BOULDERS
-2 174 16		Joo Runnig	Joint Type				
Completion (P	erf/Screen)						
	# of	Size of					
From To Dia	meter Opening	gs Openings	Description				
148 168 16			3/8X3 KNIFE				
Annular Space	(Seal/Grout/P	acker)	• • • •				
T 1		· · · · · · · · · · · · · · · ·					
There are no ar	inular space re	coras assigne	a to this well.		Driller		
					the Mo	ntana	rmed and reported in this well log is in compliance with well construction standards. This report is true to the
					pest of	ту кп	owledge.

Name: Company: CAMP WELL DRILLING License No: WWC-7 Date Completed: 5/21/1957

MONTANA WELL LOG REPORT

This well log reports the activities of a licensed Montana well driller, serves as the official record of work done within the borehole and casing, and describes the amount of water encountered. This report is compiled electronically from the contents of the Ground Water Information Center (GWIC) database for this site. Acquiring water rights is the well owner's responsibility and is NOT accomplished by the filing of this report.

Other Options

<u>Go to GWIC website</u> <u>Plot this site in State Library Digital Atlas</u> <u>Plot this site in Google Maps</u> <u>View scanned well log (11/7/2008 4:03:32 PM)</u>

Site Name: WALDORF PAPER PRODUCTS COMPANY GWIC Id: 71249					Section 7: Well Test Data				
						Total D	epth: 1	76.5	
Section 1: Wel	l Owner(s)							_evel: 21	
1) WALDORF F N/A	APER PRO	DUCTS CO	D (MAIL)			Water	Tempe	rature:	
MISSOULA MT	59801 [06/	15/1957]				Pump	Test *		
Section 2: Loc	ation							set for test _ feet.	
Township	Range	Section	Quarter	Sections			•	ump rate with _ feet of drawdown after <u>8</u> hours of	
14N	21W	24	NE ¹ ⁄	4 NW1⁄4		pumpir		ery hours.	
	County		Geod	ode				ery _ nours. er level _ feet.	
MISSOULA	-							er level <u>42</u> feet.	
Latitude	Longi	tude	Geomethod	Dat	um	Fumpi	iy wate		
46.963184	-114.20		TRS-SEC	NA	D83				
Ground Surfa	ce Altitude	Ground S	Surface Method	Datum	Date	* Durin	a the v	vell test the discharge rate shall be as uniform as	
						Danni		s rate may or may not be the sustainable yield of the	
Addition		Block		Lot				able yield does not include the reservoir of the well	
						casing.			
Section 3: Pro INDUSTRIAL (1)	posed Use	of Water				Sectio	n 8: Re	emarks	
0								ell Log	
Section 4: Typ						Geologic Source			
Drilling Method: C						112ALVM - ALLUVIUM (PLEISTOCENE)			
Status: NEW WE	LL					From	То	Description	
Section 5: Wel	I Completic	on Date				0	6	TOPSOIL	
Date well comple	-		57			6	27	GRAVEL AND SAND SOME WATER AT 24 TO 27 FEET	
•	,	, ,				27	112	SANDY CLAY	
Section 6: Wel	I Construct	ion Details	;			112	116	CLAY	
There are no bore	ehole dimensi	ions assigned	d to this well.			116	152	SANDY CLAY	
Casing		-				152		GOOD GRAVEL AND SAND WITH WATER	
	Wall	Pressu	ıre			171		CLAY GRAVEL AND BOULDERS	
From To Dia	meter Thicki	ness Rating	Joint Type			- 17 1	177	OEAT GRAVEL AND DOGEDERG	
-2 176.5 16									
Completion (Per	f/Screen)								
	# of	Size of							
From To Diam	eter Opening		Description						
155 171 16			3/8X3 KNIFE						
Annular Space (Seal/Grout/P	'acker)							
Annular Space (Seal/Grout/P	acker)							

There are no annular space records assigned to this well.

Driller Certification

All work performed and reported in this well log is in compliance with the Montana well construction standards. This report is true to the best of my knowledge.

Name: Company: CAMP WELL DRILLING License No: WWC-7 Date Completed: 6/15/1957

Deep Well #3A

							101			
		MONIANA	WELL LOG	REPU	K I			Other Options		
This well log reports the activities of a licensed Montana well driller, official record of work done within the borehole and casing, and deso amount of water encountered. This report is compiled electronically					cribes the Plot this site in State Library Digital A		<u>Go to GWIC websit</u> Plot this site in State Library Digital Atlas Plot this site in Google Map			
contents of the Ground Water Information Center (GWIC) database					for this si		View scanned well log (11/7/2008 4:06:21 PM			
Acquiring wate the filing of this		the well owne	er's responsit	oility an	Id IS NOT	accomplis	hed b	у		
Site Name: CH OPERATIONS/	-	-	-	ILL		Section	7: W	ell Test Data		
GWIC Id: 21084	44					Total De				
						Static W				
Section 1: Wel 1) CHAMPION	-		*N/11 1			Water Te	emper	aure:		
OPERATIONS/						Air Test	*			
MISSOULA MT	59806 [0	4/13/1981]						ith drill stem set at <u>70</u> feet for _ hours.		
Continue Or Las	otion							ery <u>24_</u> hours. er level _ feet.		
Section 2: Loc	_	Section	0	ter Sect	tions			er level _ feet.		
Township 14N	Range 21W	Section 24		NE ¹ /4 N						
	County			ocode	,.	* Durina	the u	ell test the discharge rate shall be as uniform as		
MISSOULA								rate may or may not be the sustainable yield of the		
Latitude		gitude	Geometho		Datum	well. Sustainable yield does not include the reservoir of the well				
46.964106 Ground Surfac		.199811 Ground S	TRS-SEC Surface Metho		NAD83 Itum Date	casing.				
Ground Sunat	Le Annuue	Ground S		u Da	itum Date	Section	8. Be	amarke		
Addition			Bloc	:k	Lot	Occuon	0. 10			
CHAMPION MILL	SITE					Section	9: W	ell Log		
Section 3: Pro		o of Wotor				Geologi	ς Soι	Irce		
DOMESTIC (1)	poseu os	e of water				112SNG	R - S.	AND AND GRAVEL (PLEISTOCENE)		
						From To	0	Description		
Section 4: Typ		ζ.				0		ASPHALT		
Drilling Method: R Status: NEW WE						1		GRAY SILTY SAND AND GRAVEL WITH SOME TAN TO BROWN CLAY		
						13	26	COARSE SILTY SAND SAND SMALL GRAVELS		
Section 5: Wel	-					26	39	GRAVEL MIXED IN TAN AND PINK CLAY		
Date well complet						39	47	SILTY TAN AND GRAY SAND WITH FEW SMALL GRAVELS MIXED IN		
Section 6: Wel		ction Details				47		PINK TO RED SAND CLAY		
Borehole dimens From To Dia	meter					51 67		TAN TO BROWN CLAY		
0 146.7	18					79		FINE TO COARSE TAN AND GRAY SILTY SAND GRAY SANDY CLAY		
Casing						88		FINE TAN SILTY SAND		
		Wall	Pressure			114	_	TAN SANDY CLAY		
	ameter	Thickness	Rating	Joint	Туре	117	119	FINE TO MEDIUM TAN AND GRAY SAND		
-1.7 166 18 Completion (Per					STEEL	119	125	TAN SILTY SAND AND CLAY IN THIN ALTERNATES		
	# of	Size of ings Openings	Description			125		FINE TAN SILTY SAND MIXED WITH FEW GRAVELS MIXED IN SILTY WATER		
144 166 9			SCREEN-CO STAINLESS	ONTINU	IOUS-	133	144	FINE TO MEDIUM TAN SILTY SAND AND GRAVEL. SILTY WATER.		
Annular Space (Seal/Grout	/Packer)	1			Driller C	ertifi	cation		
		Cont.						rmed and reported in this well log is in compliance wi		
From To Descri	ption RENE PAC	Fed?						well construction standards. This report is true to the owledge.		
Į		# J					Nai	me:		
						c	ompa	ny: LIBERTY DRILLING & PUMP CO		
						Lic		No: WWC-52		
						I Dete Ce		ad 1/12/1001		

Date Completed: 4/13/1981

GWIC Id: 2		ON INTERNATION CORP. *MILL OPERATIONS/PACKAGING DIVISION
From	То	Description
144	146	FINE SILTY SAND WITH GRAVEL AND COBBLESSTONES MIXED IN. WATER.
146	153	GRAVEL, COBBLESTONES AND BOULDERS MIXED IN FINE TO MEDIUM CLEAN SAND AND WATER
153	159	FINE TO COARSE SAND, GRAVELS, COBBLESTONES AND BOULDERS, CLEAN BUT SANDY WATER
159	161	FINE TO COARSE SILTY SAND, FEW GRAVELS, WATER.
161	163	CLEAN GRAVELS, COBBLESSTONES AND BOULDERS, LOTS OF MEDIUM TO COARSE TAN SAND.
163	166	LARGE COBBLESTONES AND BOULDERS, LOOSE AND CLEAN COARSE SAND. WATER.
166	169	FINE TO COARSE SILTY SAND, GRAVELS, COBBLESTONES AND BOULDERS, LIGHTBROWN. SEEP WATER
169	170	LARGE BOULDER, COBBLESTONES, GRAVEL AND SAND, TIGHT AND HARD
170	174	GRAVELS IN HARD WHITE CLAY
174	182	GRAVELS EMBEDDED IN PINKISH WHITE CLYA, COBBLESTONES, HARD

MONTANA WELL LOG REPORT

This well log reports the activities of a licensed Montana well driller, serves as the official record of work done within the borehole and casing, and describes the amount of water encountered. This report is compiled electronically from the contents of the Ground Water Information Center (GWIC) database for this site. Acquiring water rights is the well owner's responsibility and is NOT accomplished by the filing of this report.

Other Options

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Site Name: WA GWIC Id: 7125		ERNER PA	PER PRODUC	CTS	Sectio	n 7: W	lell Test Data		
Section 1: Well Owner(s) 1) WALDORF, HOERNER (MAIL) N/A					Static	Total Depth: 174 Static Water Level: 29 Water Temperature:			
MISSOULA MT	59801 [05/2	27/1960]			Pump	Test *			
Section 2: Loca	ation						set for test _ feet.		
Township	Range	Section	Quarter	Sections	_ • •	• •	rate with _ feet of drawdown after <u>8</u> hours of		
14N	21W	24		N ¹ /4	pumpii		k		
(County		Geoc	ode			very _ hours.		
MISSOULA	-						ter level _ feet. er level _ feet.		
Latitude	Longi	tude	Geomethod	Datum	i unpi	iy wat			
46.953966	-114.20	3758	TRS-SEC	NAD83					
Ground Surfac	e Altitude	Ground S	urface Method	Datum Da	te * During the well test the discharge rate shall be as uniform possible. This rate may or may not be the sustainable yield				
Addition Block Lot						well. Sustainable yield does not include the reservoir of the well casing.			
					0				
Section 3: Prop INDUSTRIAL (1)	posed Use	of Water			Sectio		emarks		
-		of Water			Sectio Sectio	n 9: W	lell Log		
INDUSTRIAL (1)	e of Work	of Water			Sectio Sectio Geolog	n 9: W gic So	/ell Log urce		
INDUSTRIAL (1)	e of Work HURN	of Water			Sectio Sectio Geolo 112AL	n 9: W gic So /M - A	lell Log urce LLUVIUM (PLEISTOCENE)		
INDUSTRIAL (1) Section 4: Type Drilling Method: C Status: NEW WEI	e of Work HURN _L				Sectio Sectio Geolo 112AL	n 9: W gic So /M - A To	ell Log urce LLUVIUM (PLEISTOCENE) Description		
INDUSTRIAL (1) Section 4: Type Drilling Method: C Status: NEW WEI	e of Work HURN _L				Sectio Sectio Geolo 112AL From	n 9: W gic So /M - A To 7	ell Log urce LLUVIUM (PLEISTOCENE) Description GRAVEL FILL		
INDUSTRIAL (1) Section 4: Type Drilling Method: C Status: NEW WEI Section 5: Well	e of Work HURN LL	n Date			Sectio Sectio Geolo 112AL ¹ From 0 7	n 9: W gic So /M - A To 7 26	ell Log urce LLUVIUM (PLEISTOCENE) Description GRAVEL FILL GRAVEL AND SAND SOME WATER AT 25 FEET		
INDUSTRIAL (1) Section 4: Type Drilling Method: C Status: NEW WEI Section 5: Well Date well complet	e of Work HURN LL I Completio ted: Friday, Ma	n Date ay 27, 1960			Sectio Sectio Geolo 112AL ¹ From 0 7 26	n 9: W gic So /M - A To 7 26 80	ell Log urce LLUVIUM (PLEISTOCENE) Description GRAVEL FILL GRAVEL AND SAND SOME WATER AT 25 FEET SANDY CLAY WITH SOME GRAVEL		
INDUSTRIAL (1) Section 4: Typa Drilling Method: C Status: NEW WEI Section 5: Well Date well complet Section 6: Well	e of Work HURN LL I Completio red: Friday, Ma I Constructi	n Date ay 27, 1960 ion Details			Sectio Sectio Geolo 112AL ¹ From 0 7 26 80	n 9: W gic So /M - A To 7 26 80 112	ell Log urce LLUVIUM (PLEISTOCENE) Description GRAVEL FILL GRAVEL AND SAND SOME WATER AT 25 FEET SANDY CLAY WITH SOME GRAVEL SANDY CLAY		
INDUSTRIAL (1) Section 4: Type Drilling Method: C Status: NEW WEI Section 5: Well Date well complet Section 6: Well There are no bore	e of Work HURN LL I Completio red: Friday, Ma I Constructi	n Date ay 27, 1960 ion Details			Sectio Sectio Geolo 112AL ¹ From 0 7 26	n 9: W gic So /M - A To 26 80 112 120	ell Log urce LLUVIUM (PLEISTOCENE) Description GRAVEL FILL GRAVEL AND SAND SOME WATER AT 25 FEET SANDY CLAY WITH SOME GRAVEL SANDY CLAY CLAY		
INDUSTRIAL (1) Section 4: Type Drilling Method: C Status: NEW WEI Section 5: Well Date well complet Section 6: Well There are no bore	e of Work HURN LL I Completio red: Friday, Ma I Construction	n Date ay 27, 1960 i on Details ons assigned	to this well.		Sectio Sectio Geolo 112AL ¹ From 0 7 26 80	n 9: W gic So /M - A To 7 26 80 112 120 142	ell Log urce LLUVIUM (PLEISTOCENE) Description GRAVEL FILL GRAVEL AND SAND SOME WATER AT 25 FEET SANDY CLAY WITH SOME GRAVEL SANDY CLAY CLAY SANDY CLAY		
NDUSTRIAL (1) Section 4: Type Drilling Method: C Status: NEW WEI Section 5: Well Date well complet Section 6: Well There are no bore Casing	e of Work HURN LL I Completio red: Friday, Ma I Construct shole dimension Wall	n Date ay 27, 1960 ion Details ons assigned Pressure	to this well.		Sectio Sectio Geolo 112AL From 0 7 26 80 112	n 9: W gic So /M - A To 7 26 80 112 120 142	ell Log urce LLUVIUM (PLEISTOCENE) Description GRAVEL FILL GRAVEL AND SAND SOME WATER AT 25 FEET SANDY CLAY WITH SOME GRAVEL SANDY CLAY CLAY		
INDUSTRIAL (1) Section 4: Type Drilling Method: C Status: NEW WEI Section 5: Well Date well complet Section 6: Well There are no bore Casing From To Diame	e of Work HURN LL I Completio red: Friday, Ma I Construction	n Date ay 27, 1960 ion Details ons assigned Pressure	to this well.		Sectio Geolog 112AL From 0 7 26 80 112 120	n 9: W gic So /M - A To 7 26 80 112 120 142 148	ell Log urce LLUVIUM (PLEISTOCENE) Description GRAVEL FILL GRAVEL AND SAND SOME WATER AT 25 FEET SANDY CLAY WITH SOME GRAVEL SANDY CLAY CLAY SANDY CLAY		
INDUSTRIAL (1) Section 4: Type Drilling Method: C Status: NEW WEI Section 5: Well Date well complet Section 6: Well There are no bore Casing From To Diame -1 174 16	e of Work HURN LL I Completio red: Friday, Ma I Construction hole dimension Wall eter Thicknes	n Date ay 27, 1960 ion Details ons assigned Pressure	to this well.		Sectio Geolog 112AL ¹ From 0 7 26 80 112 120 142	n 9: W gic So /M - A To 7 26 80 112 120 142 148 153	ell Log urce LLUVIUM (PLEISTOCENE) Description GRAVEL FILL GRAVEL AND SAND SOME WATER AT 25 FEET SANDY CLAY WITH SOME GRAVEL SANDY CLAY CLAY SANDY CLAY CLAY CLAY AND SOME BOULDERS		
INDUSTRIAL (1) Section 4: Type Drilling Method: C Status: NEW WEI Section 5: Well Date well complet Section 6: Well There are no bore Casing From To Diame -1 174 16	e of Work HURN LL I Completio ted: Friday, Ma I Construction chole dimension Wall eter Thickness f/Screen)	n Date ay 27, 1960 ion Details ons assigned Pressure ss Rating	to this well.		Sectio Geolog 112AL ¹ From 0 7 26 80 112 120 142 148	n 9: W gic So /M - A To 7 266 80 112 120 142 148 153 170	ell Log urce LLUVIUM (PLEISTOCENE) Description GRAVEL FILL GRAVEL AND SAND SOME WATER AT 25 FEET SANDY CLAY WITH SOME GRAVEL SANDY CLAY CLAY SANDY CLAY CLAY CLAY AND SOME BOULDERS SMALLER GRAVEL AND SAND SOME WATER		
INDUSTRIAL (1) Section 4: Type Drilling Method: C Status: NEW WEI Section 5: Well Date well complet Section 6: Well There are no bore Casing From To Diame -1 174 16 Completion (Per	e of Work HURN LL I Completio ed: Friday, Ma I Construction chole dimension Wall eter Thickness f/Screen) # of	n Date ay 27, 1960 ion Details ons assigned Pressure ss Rating Size of	Joint Type STEEL		Sectio Geolo 112AL From 0 7 26 80 112 120 142 148 153	n 9: W gic So /M - A To 7 266 80 112 120 142 148 153 170	ell Log urce LLUVIUM (PLEISTOCENE) Description GRAVEL FILL GRAVEL AND SAND SOME WATER AT 25 FEET SANDY CLAY WITH SOME GRAVEL SANDY CLAY CLAY SANDY CLAY CLAY CLAY AND SOME BOULDERS SMALLER GRAVEL AND SAND SOME WATER SAND COARSER GRAVEL AND WATER		
INDUSTRIAL (1) Section 4: Type Drilling Method: C Status: NEW WEI Section 5: Well Date well complet Section 6: Well There are no bore Casing From To Diame -1 174 16	e of Work HURN LL I Completio ed: Friday, Ma I Construction chole dimension Wall eter Thickness f/Screen) # of	n Date ay 27, 1960 ion Details ons assigned Pressure ss Rating Size of	Joint Type STEEL		Sectio Geolo 112AL From 0 7 26 80 112 120 142 148 153	n 9: W gic So /M - A To 7 266 80 112 120 142 148 153 170	ell Log urce LLUVIUM (PLEISTOCENE) Description GRAVEL FILL GRAVEL AND SAND SOME WATER AT 25 FEET SANDY CLAY WITH SOME GRAVEL SANDY CLAY CLAY SANDY CLAY CLAY CLAY AND SOME BOULDERS SMALLER GRAVEL AND SAND SOME WATER SAND COARSER GRAVEL AND WATER		

Annular Space (Seal/Grout/Packer)

There are no annular space records assigned to this well.

Driller Certification

All work performed and reported in this well log is in compliance with the Montana well construction standards. This report is true to the best of my knowledge.

Name: Company: CAMP WELL DRILLING License No: WWC-7 Date Completed: 5/27/1960

MONTANA WELL LOG REPORT	Other Options
This well log reports the activities of a licensed Montana well driller, a official record of work done within the borehole and casing, and design amount of water encountered. This report is compiled electronically contents of the Ground Water Information Center (GWIC) database a Acquiring water rights is the well owner's responsibility and is NOT a the filing of this report.	cribes the <u>Plot this site in State Library Digital Atlas</u> from the <u>Plot this site in Google Maps</u> for this site. <u>View scanned well log (11/7/2008 3:22:49 PM)</u>
Site Name: STONE CONTAINER CORPORATION * WELL 4 GWIC Id: 71233	Section 7: Well Test Data
Section 1: Well Owner(s) 1) STONE CONTAINER CORPORATION (MAIL) MULLAN RD MISSOULA MT 59806 [04/20/1987]	Total Depth: 193 Static Water Level: 27 Water Temperature: Air Test *
Section 2: Location Township Range Section Quarter Sections 14N 21W 13 SW¼ SE¼ SE¼ County Geocode MISSOULA SWA SWA	<u>2300</u> gpm with drill stem set at _ feet for <u>24</u> hours. Time of recovery _ hours. Recovery water level _ feet. Pumping water level <u>65</u> feet.
	* During the well test the discharge rate shall be as uniform as possible. This rate may or may not be the sustainable yield of the well. Sustainable yield does not include the reservoir of the well casing.
Addition Block Lot	Section 8: Remarks
Section 3: Proposed Use of Water FIRE PROTECTION (1) INDUSTRIAL (2)	Section 9: Well Log Geologic Source 112ALVM - ALLUVIUM (PLEISTOCENE)
Section 4: Type of Work	From To Description
Drilling Method: CABLE	0 0.7 CHOCOLATE BROWN TOPSOIL
Status: NEW WELL	0.7 9 LIGHT BROWN TO REDDISH CLAY
	9 18 GRAVEL EMBEDDED IN REDDISH BROWN CLAY
Section 5: Well Completion Date	18 32 GRAVEL EMBEDDED IN DARK BROWN CLAY
Date well completed: Monday, April 20, 1987	32 40 FINE SAND IN LIGHT BROWN SILTY CLAY A FEW SMALL SMALL GRAVELS SEEP OF WATER AT 32 FEET
Section 6: Well Construction Details There are no borehole dimensions assigned to this well.	40 53 FINE HARD GRAY SILTY SAND IN LIGHT BROWN CLAY SEEP OF WATER
Casing	62 83.5 LIGHT BROWN SANDY CLAY STICKY SEEP OF WATER
Wall Pressure	83.5 91 LIGHT BROWN SILTY SAND SEEP OF WATER
From To Diameter Thickness Rating Joint Type	91 98 GRAY CLAY LIKE MOLDING CLAY
-5.7 193 18	98 109 SILTY FINE LIGHT BROWN SAND SEEP OF WATER
Completion (Perf/Screen)	109 114 BROWN SANDY CLAY
# of Size of	114 117.5 BROWN SILTY SAND SEEPS OF WATER
From To Diameter Openings Openings Description	117.5 132 BROWN SANDY CLAY
150 174 18 JOHNSON SCREEN	132 138 SILTY FINE COARSE SAND AND GRAVEL SOME WATER
Annular Space (Seal/Grout/Packer) Cont.	138 142 COARSE SAND AND SMALL AMOUNT OF GRAVELS HEAVING SOME WATER
From To Description Fed?	Driller Certification
0 20 BENTONITE	All work performed and reported in this well log is in compliance with
	the Montana well construction standards. This report is true to the
	best of my knowledge.
	Name:

Company: LIBERTY DRILLING & PUMP CO License No: WWC-52 Date Completed: 4/20/1987

GWIC Id:	Site Name: STONE CONTAINER CORPORATION * WELL 4 GWIC Id: 71233 Additional Lithology Records							
From	То	Description						
142	147	FINE BROWN SAND SOME SILT AND SMALL GRAVELS SOME WATER						
147	150	FINE TO COARSE SAND AND GOOD ROUND GRAVELS SOME WATER						
150	157	SAND GRAVEL COBBLESTONES AND SMALL BOULDERS LOOSE FORMATION SOME REDDISH BROWN CLAY WADS SOME WATER						
157	170	CLEAN SAND GRAVEL COBBLESTONES AND SMALL BOULDERS SOME WATER						
170	170 GRAVEL COBBLESTONES AND BOULDERS SMALL AMOUNT OF SAND SOME WATER							
174	175	SAND GRAVEL AND COBBLESTONES IN YELLOW BROWN CLAY						
175	188	GRAVEL EMBEDDED IN GRAY CLAY						
188	193	A FEW GRAVELS IN GRAY CLAY						

MONTANA WELL LOG REPORT

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Other Options

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Site Name: WA GWIC Id: 71254		ERNER PA	PER PRODUC	TS	Sectio	on 7: W	/ell Test Data	
01110 101 1 1201					Total [)epth: 1	183.6	
					Total Depth: 183.6 Static Water Level: 21			
1) WALDORF, H	• •	(MAIL)			Water	Tempe	erature:	
N/A					Dumm	T+*		
MISSOULA MT	59801 [08/0	04/1960]			Pump	Test *		
Section 2: Loca	ation						set for test _ feet.	
Township	Range	Section	Quarter	Sections			ump rate with _ feet of drawdown after <u>8</u> hours of	
14N	21W	24	SV	V1⁄4	pumpi Timo (/ery _ hours.	
C	County		Geoco	ode			ter level _ feet.	
MISSOULA							er level 35 feet.	
Latitude	Longi	tude	Geomethod	Datum				
46.953966	-114.20)3758	TRS-SEC	NAD83				
Ground Surfac	e Altitude	Ground Su	Irface Method	Datum Date			well test the discharge rate shall be as uniform as	
							s rate may or may not be the sustainable yield of the	
Addition		Block		Lot			able yield does not include the reservoir of the well	
					casing			
Section 3: Prop	osed Use	of Water			Sectio	on 8: R	emarks	
					Sectio	on 9: W	/ell Log	
Section 4: Type	e of Work					gic So	-	
Drilling Method: C	HURN				112ALVM - ALLUVIUM (PLEISTOCENE)			
Status: NEW WEL	.L				From		Description	
Section 5: Well	Completic	on Date			0	9	TOPSOIL	
Date well complete	-		60		9	14	SAND AND GRAVEL	
	,				14	20	GRAVEL	
Section 6: Well	Construct	ion Details			20	27	SAND AND GRAVEL	
There are no bore	hole dimensi	ons assigned	to this well.		27	34	SANDY CLAY	
Casing					34	53	HEAVING SAND	
	Wall	Pressur			53	57	CLAY	
	neter Thickı	ness Rating	Joint Type		57	84	SAND	
-0.6 183.6 16					84	90	CLAY	
Completion (Perf					90	135	SAND AND FINE GRAVEL	
	# of	Size of			135		SAND GRAVEL AND CLAY	
From To Diame	eter Opening	gs Openings			148		GRAVEL SAND AND WATER	
152 170 16			3/8X3 KNIFE		168		WATER CLAY SMALL GRAVEL AND WATER	
Annular Space (S	Seal/Grout/P	acker)			180		SAND CLAY SMALL GRAVEL AND WATER	
There are no annu	ilar space re	cords assigne	d to this well					

Driller Certification

All work performed and reported in this well log is in compliance with the Montana well construction standards. This report is true to the best of my knowledge.

Name: Company: CAMP WELL DRILLING License No: WWC-7 Date Completed: 8/4/1960

MONTANA	WELL	LOG	REP	ORT
---------	------	-----	-----	-----

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Site Name: STONE CONTAINER CORPORATION * WELL 5 GWIC Id: 71231

Section 1: Well Owner(s)

1) STONE CONTAINER CORPORATION (MAIL) MULLAN RD MISSOULA MT 59806 [08/07/1987]

Section 2: Location

Township	Range	Section	Quarter	Sections
14N	21W	13	SE¼ SV	V¼ SE¼
(County		Geoco	ode
MISSOULA				
Latitude	Longi	tude	Geomethod	Datum
46.965915	-114.19	94544	TRS-SEC	NAD83
Ground Surfac	e Altitude	Ground S	urface Method	Datum Date

Addition Block Lot

Section 3: Proposed Use of Water

FIRE PROTECTION (1) INDUSTRIAL (2)

Section 4: Type of Work

Drilling Method: CABLE Status: NEW WELL

Section 5: Well Completion Date

Date well completed: Friday, August 7, 1987

Section 6: Well Construction Details

There are no borehole dimensions assigned to this well. **Casing**

From	То	Diamete	Wall r Thickne	ss	Pressu Rating		Joint	Туре
-5.3	169	18						
Comp	Completion (Perf/Screen)							
			# of	Siz	ze of			
From	То	Diameter	Openings	Ор	enings	Des	criptio	n
144	169	18				SCF	REEN-S	STEEL
Annular Space (Seal/Grout/Packer)								
Annula	ar Sp	bace (Seal	/Grout/Pac	ker)				

From	10	Description	Fed?
0	20	BENTONITE	

Other Options

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Section 7: Well Test Data

Total Depth: 169 Static Water Level: 28 Water Temperature:

Air Test *

<u>2000</u> gpm with drill stem set at _ feet for <u>82.5</u> hours. Time of recovery _ hours. Recovery water level _ feet. Pumping water level <u>58</u> feet.

* During the well test the discharge rate shall be as uniform as possible. This rate may or may not be the sustainable yield of the well. Sustainable yield does not include the reservoir of the well casing.

Section 8: Remarks

Section 9: Well Log Geologic Source

112ALVM - ALLUVIUM (PLEISTOCENE)

From	То	Description
0	2	TOPSOIL
2	9	PINKISH CLAY
9	34	GRAVEL AND COBBLESTONES MIXED IN SILT
34	111	FINE SAND WITH CLAY LENSES
111	122	GRAY SANDY CLAY
122	128	FINE GRAY SAND
128	140	FINE TO MEDIUM SAND WITH A FEW GRAVELS SOME WATER
140	145	MEDIUM TO COARSE SAND AND GRAVEL WITH PINKISH CLAY WADS WATER
145	147	SMALL TO LARGE GRAVEL AND COBBLESTONES AND SOME FINE SAND WATER
147	157	SMALL TO LARGE GRAVEL AND COBBLESTONES IN FINE TO COARSE SAND WATER
157	165	GRAVEL COBBLESTONES AND BOULDERS LESS SAND WATER
165	169	SMALL TO LARGE GRAVEL COBBLESTONES AND BOULDERS MORE FINE TO COARSE SAND WATER
169	170	REDDISH BOULDER
170	175	REDDISH GRAVEL EMBEDDED IN PINK LIGHT GRAY AND GREEN CLAY
175	179	LIGHT GRAY CLAY AND RED ROCK

Driller Certification

All work performed and reported in this well log is in compliance with the Montana well construction standards. This report is true to the best of my knowledge.

Name:

Company: LIBERTY DRILLING & PUMP CO License No: WWC-52 Date Completed: 8/7/1987

GWIC Id:		Deep Well #5A CONTAINER CORPORATION * WELL 5 (Records				
From	From To Description					
175	190	ORANGE CLAY				
179	190	SMALL GRAVEL EMBEDDED IN PINK GRAY GREEN AND				

MONTANA WELL LOG REPORT

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L	-								
Site Name: COMPANY		RF HOER	NER PAP	ER PRO	DUC	TS	Sectio	on 7: W	Vell Test Data
GWIC Id: 7							Total D	onth.	160.3
•••••••••••									Level: 22.33
Section 1:		ner(s)							erature:
		• •					valei	Tempe	
1) WALDOF	KF, HUEF		IL)				Pump	Tost *	
N/A		11 100/10/1	0611				i unip	1631	
MISSOULA	1011 0900	1 [00/12/1	901]				Denth	numn	set for test _ feet.
Cootion O.	l ti						•	• •	pump rate with _ feet of drawdown after <u>10</u> hours of
Section 2:		_		-			pumpii		
Townshi	•	0	ection	Qı		Sections			very _ hours.
14N		1W	24			V ¹ ⁄4			iter level _ feet.
	Count	ty			Geoco	ode		•	ter level <u>38.3</u> feet.
MISSOULA								0	
Latitude	Ð	Longitude		Geomet		Datum			
46.95396	6	-114.20375	8	TRS-SI	EC	NAD83	* Durin	ig the i	well test the discharge rate shall be as uniform as
Ground S	urface Alt	itude G	round Sur	face Met	thod	Datum Date	possib	le. Thi	s rate may or may not be the sustainable yield of the
							well. S	ustain	able yield does not include the reservoir of the well
Addition			Block			Lot	casing		
							Sactio	n 9. D	emarks
Section 3:	Propose	d Use of V	Vater				Sectio	0. K	
DOMESTIC	-						Santia	n 0, 14	
201120110	(•)								Vell Log
Section 4:	Type of \	Nork					Geolo	-	
Drilling Meth									LLUVIUM (PLEISTOCENE)
Status: NEW							From		Description
							0	7	PIT
Section 5:	Well Cor	npletion D	ate				7	12	CLAY
Date well cor	npleted: S	aturday, Aug	gust 12, 196	61			12	25	SAND AND GRAVEL
			-				25	45	SAND
Section 6:	Well Cor	nstruction	Details				45		SANDY CLAY
There are no	borehole	dimensions	assigned to	this wel	Ι.		101		HARD PACKED SAND WITH SOME CLAY
Casing			-				145		SAND AND GRAVEL SOME CLAY
		Wall	Pressure				154		SAND GRAVEL AND WATER
From To	Diameter	Thickness	Rating	Joint T	ype				
2 169.3	16			S	TEEL		159		TIGHT GRAVEL SAND AND WATER
Completion	(Perf/Scre	en)	•				167	169	LOOSE GRAVEL SAND AND WATER
	Ì	# of	Size of				169	224	TIGHT CLAY WITH GRAVEL SOME BOULDERS NO
From To	Diameter	Openings	Openings	Descrip	otion				WATER
148.3 155.3				3/8X3 K					
159.4 162.3				3/8X3 K					
Annular Spa		Grout/Packe	er)	0,0,10	<u> </u>				
, and a ope			.,						
There are no	annular s	pace records	s assigned	to this w	ell.				fication
									ormed and reported in this well log is in compliance with
									well construction standards. This report is true to the
							best of	f my kr	nowledge.

Name: Company: CAMP WELL DRILLING License No: WWC-7 Date Completed: 8/12/1961

MONTANA WELL LOG REPORT

This well log reports the activities of a licensed Montana well driller, serves as the official record of work done within the borehole and casing, and describes the amount of water encountered. This report is compiled electronically from the contents of the Ground Water Information Center (GWIC) database for this site. Acquiring water rights is the well owner's responsibility and is NOT accomplished by the filing of this report.

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Site Name: COMPANY	WALDOR	F HOEF	RNEF	R PAPER P	RODUC	TS		Sectio	n 7: W	ell Test Data		
GWIC Id: 71266 Section 1: Well Owner(s)								Total Depth: 162 Static Water Level: 5.8 Water Temperature:				
1) WALDOF			AIL)					Pump	•			
N/A MISSOULA	MT 59801	[06/25/	1966	1				i unip	1631			
Section 2: LocationTownshipRangeSectionQuarter Sections14N21W25SW¼ NW¼ SW¼CountyGeocodeMISSOULA						N ¹ /4 SW ¹ /4		Depth pump set for test _ feet. <u>2000</u> gpm pump rate with _ feet of drawdown after <u>4</u> hours of pumping. Time of recovery _ hours. Recovery water level _ feet. Pumping water level <u>22.1</u> feet.				
Latitude	. 1	ongituo	le	Geon	nethod	Datur	m					
46.94045		14.2077			S-SEC	NAD8		* Durin	a the v	vell test the discharge rate shall be as uniform as		
	u <mark>rface Altitu</mark> 3088	Ide	Grou	nd Surface I	Method	Datum D		possib	le. This	s rate may or may not be the sustainable yield of the able yield does not include the reservoir of the well		
Addition	0000		Bl	ock		Lot		casing				
	_							Sectio	n 8: R	emarks		
Section 3:	-	Use of	wate	er				•				
INDUSTRIAL	(1)									lell Log		
Section 4:	Type of W	ork						Geolo	-			
Drilling Metho		JIK						112ALVM - ALLUVIUM (PLEISTOCENE)				
Status: NEW								From	То	Description		
								0	0.5	BLACK DIRT		
Section 5:	Well Comp	letion	Date					0.5	17	FINE SAND AND LARGE GRAVEL MIXED		
Date well cor	npleted: Sat	urday, Ju	ine 25	5, 1966				17	28	FINE SILTY GRAY SAND		
								28	31	GRAY SAND AND COARSE		
Section 6: There are no					well.			31	49	FINE TO GRAY BROWN SILTY SAND FEW SCATTERED GRAVEL		
Casing								49	57	BROWN SITY SAND FINE FEW SCATTERED GRAVELS		
	_	Wall		Pressure		_		57	78	VERY SILTY BROWN SAND WITH CLAY LENSES		
From To -0.5 162	Diameter 18	Thickne	ess	Rating	Joint 1	уре		78	84	CLEANER SLIGHTLY COARSER BROWN SAND W/SOME GRAVEL		
Completion	(Perf/Scree	n)		- 				84	90	BROWN CLAY		
	# c		Size					90	94	GRAVEL IMBEDDED IN BLUE GRAY CLAY		
From To D		enings	Open	ings Descr	iption			94	108	FINE BROWN SILTY SAND		
116 146 1 Annular Spa		out/Pacl	ker)	JOHN	SON SCI	REEN		108	115	COARSER CLEANER BROWN SAND FEW SCATTERED GRAVELS SOME FINE MICA MIXED IN		
There are no	annular spa	ce recor	ds as:	signed to this	s well.			115	131	COARSE GRAVEL MIXED WITH VERY FINE BROWN TO GRAY SAND SOME FINE MICA MIXED IN		
								131	134.5	BROWN SAND		
								134.5	144	FINE TAN TO BROWN SAND MIXED COARSE GRAVEL		
								Driller	Certif	ication		
										ormed and reported in this well log is in compliance with		
										well construction standards. This report is true to the		
								pest of	° my kn	owledge.		

Name: Company: LIBERTY DRILLING & PUMP CO License No: WWC-52 Date Completed: 6/25/1966

 Site Name: WALDORF HOERNER PAPER PRODUCTS COMPANY

 GWIC Id: 71266

 Additional Lithology Records

 From To Description

 144
 148
 VERY FINE BLUE GRAY SAND MIXED WITH GRAVEL AND COBBLESTONES

 148
 162
 FRACTURED GREEN ARGILLITE

MONTANA WELL LOG REPORT

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Other Options

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Site Name: HOERNER WALDORF CORP GWIC Id: 71265

Section 1: Well Owner(s)

1) HOERNER WALDORF CORP (MAIL) DRAWER D MISSOULA MT 59801 [08/29/1973]

Section 2: Location

Township	Range	Section	Quarter	Sections	
14N	21W	25	NW ¹ /2	SW1⁄4	
C	County		Geoc	ode	
MISSOULA					
Latitude	Longitu	ude	Geomethod	Datum	1
46.94136	-114.206	395	TRS-SEC	NAD83	3
Ground Surfac	e Altitude	Ground S	urface Method	Datum Da	ate
3080					
Addition		Block		Lot	

Section 3: Proposed Use of Water

INDUSTRIAL (1)

Section 4: Type of Work

Drilling Method: CABLE Status: NEW WELL

Section 5: Well Completion Date

Date well completed: Wednesday, August 29, 1973

Section 6: Well Construction Details

There are no borehole dimensions assigned to this well.

Casin	g								
From	То	Diamete			ess	Pressu ess Rating		Joint	Туре
-1.8	163	3 18							
Comp	Completion (Perf/Screen)								
			# c	of	Size of				
From	То	Diameter	Op	enings	Open	ings	Descr	iption	
115	163	18					JOHN	SON SO	CREEN
Annul	ar S	pace (Seal	/Gr	out/Pac	ker)				

There are no annular space records assigned to this well.

* During the well test the discharge rate shall be as uniform as possible. This rate may or may not be the sustainable yield of the well. Sustainable yield does not include the reservoir of the well

2000 gpm with drill stem set at _ feet for 95 hours.

Section 8: Remarks

Section 7: Well Test Data

Total Depth: 163

Air Test *

Static Water Level: 14 Water Temperature:

Time of recovery _ hours. Recovery water level _ feet. Pumping water level <u>37</u> feet.

MILL DIVISION

casing.

Section 9: Well Log

Geologic Source

112ALVM - ALLUVIUM (PLEISTOCENE)

From	То	Description
0	2	TAN TOPSOIL
2	9	SAND GRAVEL COBBLESTONES AND BOULDERS
9	24	SAND WITH FEW GRAVELS MIXED IN
24	66	SAND MIXED IN REDDISH BROWN CLAY CONGLOMERATE
66	68	SAND AND COARSE GRAVEL
68	74	SAND REDDISH BROWN CLAY CONGLOMERATE
74	79	CLEAN SAND WITH FEW GRAVELS MIXED IN
79	89	SAND AND GRAVEL WITH STRINGERS OF CLAY
89	97	CEMENTED SANDY CLAY
97	102	SAND AND GRAY CLAY IN ALTERNATE LAYERS FEW GRAVELS MIXED IN
102	105	COARSE GRAVEL COBBLESTONES AND FINE GRAY BLUE SAND
105	108	WITH TAN AND REDDISH BROWN CLAY LENSES
108	114	GRAVEL SOME SAND WITH STRINGERS OF TAN CLAY
114	122	CLEAN COARSE GRAVEL COBBLESTONES AND BOULDERS SOME FINE TO COARSE SAND
122	148	GRAVEL COBBLESTONES AND BOULDERS SOME SAND AND FINE MICA MIXED IN

Driller Certification

All work performed and reported in this well log is in compliance with the Montana well construction standards. This report is true to the best of my knowledge.

Name: Company: LIBERTY DRILLING & PUMP CO License No: WWC-52 Date Completed: 8/29/1973

/14/2019		Deep Well #12					
Site Name: HOERNER WALDORF CORP GWIC Id: 71265 Additional Lithology Records							
	_	Description					
From	То	Description					
From 148		GRAY GREEN ARGILLITE SOME FRACTURES					
From 148 154	154						

MONTANA WELL LOG REPORT

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Other Options

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Site Name: HOERNER WALDORF GWIC Id: 71270

Section 1: Well Owner(s)

1) CHAMPION INTERNATIONAL (MAIL) DRAWER D MISSOULA MT 59806 [09/26/1978]

Section 2: Location

Township	Range	Section	Quarter	Sections	
14N	21W	25	NW1⁄4 SV	N¼ SW¼	
(County		Geoc	ode	
MISSOULA					
Latitude	Longi	tude	Geomethod	Dat	um
46.938643	-114.20	07714	TRS-SEC	NAI	D83
Ground Surfac	e Altitude	Ground S	urface Method	Datum	Date
3050)				
Addition		Block		Lot	

Section 3: Proposed Use of Water

INDUSTRIAL (1)

Section 4: Type of Work

Drilling Method: CABLE Status: NEW WELL

Section 5: Well Completion Date

Date well completed: Tuesday, September 26, 1978

Section 6: Well Construction Details

There are no borehole dimensions assigned to this well.

Casing

From	То	Diamete	Wall Thickne		Pressure Rating		Joint	Туре
_	<u> </u>			,33 1.4	rtating		00111	
-2.6	149.6	18						STEEL
Comp	Completion (Perf/Screen)							
			# of	Size of	F			
From	То	Diameter	Openings	Openir	ngs	Desc	ription	I
112	149.6	18				JOH	NSON	SCREEN
Annul	ar Spa	ce (Seal/G	Grout/Pack	er)				

There are no annular space records assigned to this well.

Section 7: Well Test Data

Total Depth: 149.6 Static Water Level: 15.79 Water Temperature:

Air Test *

<u>2000</u> gpm with drill stem set at _ feet for <u>17.5</u> hours. Time of recovery _ hours. Recovery water level _ feet. Pumping water level <u>78</u> feet.

* During the well test the discharge rate shall be as uniform as possible. This rate may or may not be the sustainable yield of the well. Sustainable yield does not include the reservoir of the well casing.

Section 8: Remarks

Section 9: Well Log Geologic Source 112ALVM - ALLUVIUM (PLEISTOCENE)

•••=	•••••••••	
From	То	Description
0	0.5	BLACK TOPSOIL
0.5	3	GRAY SANDY LOAM
3	35	CLEAN SAND SMALL GRAVELS AND COBBLES
35	48.5	COARSE TO FINE SILTY GRAY SAND LARGE GRAVELS AND COBBLES
48.5	60	PINKISH TAN CLAY AND GRAY SILTY SAND
60	80	PINK TAN CLAY AND SILTY SAND MEDIUM GRAVELS
80	106	PINKISH TAN CLAY SMALL AMOUNT OF SAND AND GRAVELS
106	109	TAN GRAY CLAY SMALL AMOUNT OF SAND AND GRAVEL MIXED IN
109	113	LOOSE GRAY SAND SMALL TO LARGE GRAVELS STRINGERS OF CLAY
113	117	CLEAN GRAY SAND GRAVELS AND COBBLES WATER
117	119	LOOSE GRAY SAND GRAVELS COBBLES AND BOULDERS
119	124	CLEAN SAND GRAVELS AND BOULDERS
124	128	LOOSE GRAY SAND CLEAN GRAVELS COBBLES AND BOULDERS
128	137	CLEAN SAND SMALL TO LARGE GRAVELS COBBLES AND BOULDERS
137	141.5	GRAVEL BOULDERS WITH SMALL AMOUNT OF SAND MIXED IN

Driller Certification

All work performed and reported in this well log is in compliance with the Montana well construction standards. This report is true to the best of my knowledge.

Name:

Company: LIBERTY DRILLING & PUMP CO

License No: WWC-52

Date Completed: 9/26/1978

GWIC Id:	Site Name: HOERNER WALDORF GWIC Id: 71270 Additional Lithology Records						
From	То	Description					
141.5	149.6	GREEN GRAY SHALE					

eep Well #14

MONTANA WELL LOG REPORT

This well log reports the activities of a licensed Montana well driller, serves as the official record of work done within the borehole and casing, and describes the amount of water encountered. This report is compiled electronically from the contents of the Ground Water Information Center (GWIC) database for this site. Acquiring water rights is the well owner's responsibility and is NOT accomplished by the filing of this report.

Other Options

Go to GWIC website Plot this site in State Library Digital Atlas Plot this site in Google Maps View scanned well log (11/7/2008 4:22:29 PM)

COMPANY										Section 7: Well Test Data			
GWIC									Total Depth: 160 Static Water Level: 8.5				
Sectio	n 1:	Well Ov	vner(s)						Water	Tempe	erature:		
1) WAL	DO	RF, HOE	RNER (M	AIL)									
N/A									Air Te	st *			
MISSO	ULA	MT 598	301 [08/18	/1966	5]								
											<i>i</i> th drill stem set at _ feet for <u>41</u> hours.		
Section 2: Location											very _ hours.		
Tow	nshi	a B	lange	Secti	on	Qu	arter S	ections			ter level _ feet.		
	4N	•	21W	25			SW1/4 S	SW1/4	Pumpi	ng wat	er level <u>29.5</u> feet.		
•		Cour		_0			Geoco						
MISSOL	ΠΔ	000	ity.										
	titud	•	Longitu	do		eometh	ad	Datum			well test the discharge rate shall be as uniform as		
			Longitu								s rate may or may not be the sustainable yield of the		
	33773		-114.2063			TRS-SE		NAD83	well. S	ustaina	able yield does not include the reservoir of the well		
Grou	nd S	urface A 3088	ltitude	Grou	nd Surfa	ace Met	hod	Datum Date	casing				
Additio	n			Bl	ock			Lot	Sectio	on 8: R	emarks		
•		-							Sectio	on 9: W	/ell Log		
		-	ed Use of	wate	er				Geolo	Geologic Source			
INDUST	RIA	_ (1)							112AL	VM - A	LLUVIUM (PLEISTOCENE)		
Sectio	n 4:	Type of	Work						From		Description		
		od: CABL							0	1.5	BLACK DIRT		
Status:									1.5	6	GRAVEL AND COBBLESTONES W/ SOME TAN SILT MIXED IN		
			mpletion Thursday, A			6			6	34	TAN TO GRAY SILT MIXED WITH GRAVEL AND COBBLESTONE		
			nstructio	Ū	·	0			34	63	FINE DARK GRAY AND BROWN SILTY SAND WITH LENSES OF TAN SILTY CLAY		
			dimension			this well			63	86	COARSE BROWN SAND AND TAN CLAY IN ALTERNATE LAYERS WATER IN SAND STRATAS		
	Ta	Diamata	Wall		Pressu				86	91	FINE BROWN SAND WITH VERY FEW SCATTERED GRAVELS WATER		
	То	Diamete	r Thickn	622	Rating	10	int Ty	he	91	93	CLEAN COARSE GRAVEL WATER		
	160								93		TAN TO GRAY CLAY		
Comple	etion	(Perf/Sci									FINE SAND MICA SILT AND SOME CLAY MIXED WITH		
From 1			# of Openings	Size (Open		escriptio	on		106	114	COARSE GRAVEL CLEANED UP GOOD IN SUMP BUT MADE MUD WHEN DRILLED AHEAD		
113 1	40 1	8			JC	HNSON	SCRI	EEN			FINE SAND AND COARSE GRAVELCLEANER W/HIGHER		
			/Grout/Pac	ker)	,			1	114	141	%AGE OF GRAVEL AND COBBLESTONES SOME CLAY SHOWING		
There a	re no	annular	space recor	rds as	signed to	o this we	ell.		141	142	FINE SAND GRAVEL AND BROKEN ROCK MIXED IN TAN CLAY		
									142	160	ROCK GRAY LIMESTONE		
										İ			
									Driller	Certif	ication		
											ormed and reported in this well log is in compliance with		

All work performed and reported in this well log is in compliance with the Montana well construction standards. This report is true to the best of my knowledge.

Name: Company: LIBERTY DRILLING & PUMP CO License No: WWC-52 Date Completed: 8/18/1966

Deep Well #15

MONTANA WELL LOG REPORT

This well log reports the activities of a licensed Montana well driller, serves as the official record of work done within the borehole and casing, and describes the amount of water encountered. This report is compiled electronically from the contents of the Ground Water Information Center (GWIC) database for this site. Acquiring water rights is the well owner's responsibility and is NOT accomplished by the filing of this report.

Other Options

<u>Go to GWIC website</u> <u>Plot this site in State Library Digital Atlas</u> <u>Plot this site in Google Maps</u> <u>View scanned well log (11/7/2008 4:19:59 PM)</u>

		HOERNE	ER WALD	ORF	COR	Ρ				Sectio	n 7: W	ell Test Data	
	Id: 71	er Right: 2	2789							Total D	onth.	150	
	/ Wale	i Nigitti i	2705							Total Depth: 158 Static Water Level: 16			
Section 1: Well Owner(s)									Water				
1) HOERNER WALDORF CORP (MAIL)													
									Air Te	st *			
MISS	OULA	MT 5980	1 [12/11/1	1976]									
												rith drill stem set at _ feet for <u>8</u> hours.	
		_ocation										/ery _ hours. ter level _ feet.	
То	wnship		J .	Sectio	on			r Sectio				er level 73 feet.	
	14N		W	25				IW¼ SW	11/4	•	0		
MISSO		County	y				Geo	code					
	atitude		Longitud	e	(Geom	ethod	г	Datum			vell test the discharge rate shall be as uniform as	
	.94045		-114.2077				-SEC		AD83	•		s rate may or may not be the sustainable yield of the able yield does not include the reservoir of the well	
		irface Altit			d Surf		lethod		m Date	casing	ustanne		
Additi	on			Blo	ock			Lot		Sectio	n 8: R	emarks	
Section	on 3. F	Proposed	l lise of l	Nate	r							lell Log	
	STRIAL	-		Tato	•					Geolo	-		
		(.)								112AL	√M - A	LLUVIUM (PLEISTOCENE)	
Section	on 4: 1	Type of W	/ork								То	Description	
		d: CABLE								0		BLACK TOPSOIL	
Status	: NEW	WELL								0.5		TAN SANDY LOAM	
Casti			mintion F							5		TAN SAND COBBLESTONES GRAVEL AND BOULDERS	
		Nell Com	-		or 11	1076				34		LIGHT TAN SAND WITH FEW SCATTERED GRAVELS	
Date		ipieleu. Sa	iluruay, De	cent	er II,	1970				49	72	SILTY SAND AND MICA WITH STRINGERS OF CLAY	
		Nell Con								72	89	SILTY SAND SMALL GRAVELS WITH STRINGERS OF CLAY	
There Casing		borehole d		assię	gned to	this v	vell.	-	-	89	91	LIGHT TAN SAND SMALL GRAVELS WITH STRINGERS OF PINK CLAY	
	L		Wall		Press			L		91	100	CLEAN SAND AND SMALL GRAVELS	
From	-	Diamete	r Thickn	ess	Rating	3	Joint		4	100	104	SILTY SAND WITH STRINGERS OF PINK CLAY	
-3 140	118 157.9	18 16						STEEL STEEL	-	104	106	FINE SAND GRAVEL AND COBBLESTONES SOME WATER	
Comp	letion (Perf/Scree	en) # of	Size	of				-	106	111	CEMENTED SAND AND GRAVEL W/STRINGERS OF PINK CLAY	
From	то	Diameter				Desc	ription			111	114	LOOSE SAND AND GRAVEL	
118.9	142.9	16				_	-	SCREEN	Ī	114	118	GRAVEL AND SAND WITH STRINGERS OF LIGHT BROWN CLAY	
Annul	ar Spa	ce (Seal/G	rout/Pack	er)						118	125	COARSE SAND GRAVEL AND COBBLESTONES WATER	
There	are no	annular sp	ace record	ls ass	igned t	o this	well.			125		GRAVEL COBBLESTONES BOULDERS & COARSE SAND	
												WATER	
												ormed and reported in this well log is in compliance with	
										the Mo	ntana	well construction standards. This report is true to the	
										best of	my kn	owledge.	
											Na	me:	

Company: LIBERTY DRILLING & PUMP CO License No: WWC-52 Date Completed: 12/11/1976

Deep Well #15

Site Name: HOERNER WALDORF CORP GWIC Id: 71267 Additional Lithology Records

Additiona	Additional Lithology Records											
From	То	Description										
137	138	FINE TO COARSE SAND GRAVEL COBBLESTONES AND BOULDERS										
138	140	LARGE BOULDERS COBBLESTONES & CEMENTED SAND WATER										
140	143	LOOSE GRAVELS COBBLESTONES BOULDERS AND COARSE SAND WATER										
143	1///	GREEN AND BLUE GRAY SHALE DEEP GREEN ARGILLITE WITH STRINGERS OF BROWN CLAY										
147	156	GREEN AND GRAY ARGILLITE WITH STRINGERS OF CLAY										
156	158	HARD GREEN AND GRAY ARGILLITE										

MONTANA WELL LOG REPORT

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Other Options

<u>Go to GWIC website</u> <u>Plot this site in State Library Digital Atlas</u> <u>Plot this site in Google Maps</u> <u>View scanned well log (11/7/2008 4:22:03 PM)</u>

Site Name: HOERNER WALDORF GWIC Id: 71268

Section 1: Well Owner(s)

1) CHAMPION INTERNATIONAL (MAIL) DRAWER D MISSOULA MT 59806 [07/19/1978]

Section 2: Location

Township	Range	Section	Quarter	Quarter Sections			
14N	21W	25	SW¼ NV	W1⁄4 NW1⁄4 SW1⁄4			
C	ounty		Geoc	ode			
MISSOULA							
Latitude	Longi	tude	Geomethod	Datum			
46.940454	-114.20)7714	TRS-SEC	NAD83			
Ground Surfac	e Altitude	Ground S	urface Method	Datum Date			
3060							
Addition		Block		Lot			

Section 3: Proposed Use of Water

INDUSTRIAL (1)

Section 4: Type of Work

Drilling Method: CABLE Status: NEW WELL

Section 5: Well Completion Date

Date well completed: Wednesday, July 19, 1978

Section 6: Well Construction Details

There are no borehole dimensions assigned to this well.

Casing

То		Diamete		Vall Thickne	ess	Press Rating		Joint	Туре		
16	1.5	18							STEEL		
Completion (Perf/Screen)											
То		Diameter						ription	1		
161	1.5 1	18					JOH	NSON S	SCREEN		
ar S	spac	e (Seal/G	irou	t/Packe	er)						
То	Des	scription		Cont. Fed?							
95	PU	DDLED C	LAY								
	16 Ietic To 161 ar S	To I 161.5 1 ar Spac	161.5 18 letion (Perf/Screetor) 10 To Diameter 161.5 18 ar Space (Seal/O To Description	To Diameter 1 161.5 18 Image: state stat	To Diameter Thickne 161.5 18 Thickne letion (Perf/Screen) To Diameter Openings 161.5 18 ar Space (Seal/Grout/Packe	To Diameter Thickness 161.5 18 Iteration (Perf/Screen) Interference # of Size To Diameter Openings Ope 161.5 18 Iteration Iteration To Diameter Openings Ope 161.5 18 Iteration Iteration ar Space (Seal/Grout/Packer) Cont. Cont. To Description Fed?	To Diameter Thickness Rating 161.5 18 Image: State of the state	To Diameter Thickness Rating 161.5 18 Image: Constraint of the state of the	To Diameter Thickness Rating Joint 161.5 18 Image: State of the		

Section 7: Well Test Data

Total Depth: 161.5 Static Water Level: 15.6 Water Temperature:

Air Test *

<u>2000</u> gpm with drill stem set at _ feet for <u>18</u> hours. Time of recovery _ hours. Recovery water level _ feet. Pumping water level <u>78</u> feet.

* During the well test the discharge rate shall be as uniform as possible. This rate may or may not be the sustainable yield of the well. Sustainable yield does not include the reservoir of the well casing.

Section 8: Remarks

Section 9: Well Log Geologic Source 112ALVM - ALLUVIUM (PLEISTOCENE)

From	То	Description
0	1	BROWN TOPSOIL
1	9	TAN SAND AND GRAVEL
9	31	SAND GRAVEL COBBLES & BOULDERS IN LIGHT TAN CLAY
31	39	TAN SANDY CLAY WITH FEW SCATTERED GRAVELS
39	56	PINKISH TAN CONSOLIDATED CLAY
56	62	TAN ROPEY SAND WITH FEW SCATTERED GRAVELS
62	72	PINKISH TAN AND GRAY CLAY
72	73	GRAVELS AND COBBLES IN TAN CLAY
73	95	TAN CLAY
95	96	SILTY SAND AND MEDIUM GRAVELS WITH STRINGERS OF LIGHT BROWN CLAY
96	106	SILTY TAN CLAY AND FEW SMALL GRAVELS
106	109.5	GRAVELS AND COBBLES WITH STRINGERS OF LIGHT BROWN CLAY
109.5	111.5	MEDIUM TAN SAND AND CLEAN COBBLES
111.5	113	TAN SAND MEDIUM GRAVELS SOME CLAY ON GRAVELS
113	120	SANDY GRAVELS AND COBBLES WATER

Driller Certification

All work performed and reported in this well log is in compliance with the Montana well construction standards. This report is true to the best of my knowledge.

Name:	
Company: LIBERTY DRILLING & PUMP CO	
License No: WWC-52	
Date Completed: 7/19/1978	

Deep Well #16

Site Name: HOERNER WALDORF GWIC Id: 71268 Additional Lithology Records										
From	То	Description								
120	138	CLEAN GRAVEL BOULDERS AND COBBLES SOME WATER								
138	138.5	FINE TO COARSE SAND SMALL GRAVELS WATER								
138.5	143.5	GRAVELS COBBLES MEDIUM TO FLAT BOULDERS AND COARSE SAND								
143.5	145	BOULDERS COBBLES FEW GRAVELS COARSE SAND WATER								
145	146	GREEN SHALE SMALL AMOUNT OF COARSE SHARP SAND								
146	149	BLUE GREEN SHALE								
149 161.5 GRAY GREEN SHALE										

MONTANA WELL LOG REPORT

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Other Options

<u>Go to GWIC website</u> <u>Plot this site in State Library Digital Atlas</u> <u>Plot this site in Google Maps</u> <u>View scanned well log (11/7/2008 4:16:37 PM)</u>

Site Na COMP		WALD	ORF	HOEF	RNER	PA	PER P	RODU	стѕ		Section 7: Well Test Data				
GWIC											Total Depth: 162 Static Water Level: 11.8				
Sectio	n 1:	Well Ov	vner	(s)							Water Temperature:				
1) WALDORF, HOERNER (MAIL)												р - -			
N/A										Air Te	st *				
MISSC	ULA	MT 598	301 [09/08/	1966]									
													ith drill stem set at _ feet for <u>36.5</u> hours.		
Section 2: Location											Time of recovery _ hours.				
Том	nshi	p F	Rang	е	Sectio	on		Quarte	r Secti	ons		•		ier level _ feet.	
1	4N		21Ŵ		25			NW	1⁄4 SW1⁄2	4	Pumpi	ing w	ate	er level <u>34.2</u> feet.	
		Cou	nty					Geo	code						
MISSO	ULA		-								* Durir	na th	<u>م</u> 14	vell test the discharge rate shall be as uniform as	
Lat	itude		Lor	ngitude	•		Geom	ethod		Datum				s rate may or may not be the sustainable yield of the	
46.9	94136	6	-114	.20639	5		TRS-	SEC		NAD83				able yield does not include the reservoir of the well	
Grou	nd S	urface A 3088	ltituc	le	Grour	nd Su	Irface I	Nethod	Dat	um Date	casing	<i>]</i> .		,	
Additio	n	5000			Blo	ock			Lot		Sectio	on 8:	Re	emarks	
											•	•			
Sectio	n 3.	Propos	ed U	lse of	Wate	r								ell Log	
INDUS			04 0	00 01	mato	•					Geologic Source				
		-(')									112AL	.VM -	A	LLUVIUM (PLEISTOCENE)	
Sectio	n 4:	Type of	Wo	rk							From	То		Description	
		od: CABI									0)	1	DIRT	
Status:	NEW	WELL									1		22	SAND GRAVEL COBBLESTONES AND BOULDERS WITH SOME TAN SILT MIXED IN	
		Well Co				hor 8	1066				22	2	27	TAN TO GRAY SILT MIXED W/GRAVEL AND COBBLESTONES	
							, 1900				27	'	34	FINE SAND MIXED WITH COARSE GRAVEL IN THIN ALTERNATE LAYERS	
		Well Co					to this .	vall			34	Ļ	43	CLEAN FINE BROWN SAND	
Casing	re no	borehole	e aim	ension	s assig	gnea		wen.			43		-	TAN TO GRAY SANDY CLAY	
			lv	Vall		Dros	sure			1	56	+	_	FINE GRAY SAND MIXED WITH TAN SILT	
From	То	Diamete		hickne		Rati		Joint	Type					GRAY SAND AND GRAVEL WITH SOME TAN SILT MIXED	
-	162						.9		.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		91		94	IN	
Comple	tion	(Perf/Sc	reen))						T	94		_	GRAVEL IMBEDDED IN TAN SANDY CLAY	
			# of		Size c						108	1		VERY FINE TAN SAND AND GRAVEL	
	_)iameter	Оре	nings	Open	ings		-			114	. 1	_	FINE TAN SAND AND GRAVEL	
· · ·	146 1 r Spa	8 ace (Sea	/Gro	ut/Pac	ker)		JOHNS	SON SC	REEN		123	8 1	28	FINE TAN SAND W/WELL GRADED FINE TO COARSE GRAVELS	
/ initialia				uur uu							128	3 1	30	FINE TAN SAND AND GRAVEL	
There are no annular space records assigned to this well.											130) 1	33	FINE TAN SAND W/WELL GRADED FINE TO COARSE GRAVELS	
											133	3 1	38	FINE TAN SAND MIXED WITH COARSE GRAVELS AND BOULDERS	
											Drillor	r Cor	tifi	cation	
														rmed and reported in this well log is in compliance with	
														well construction standards. This report is true to the	
														owledge.	
													Na	me:	
											1	-			

Company: LIBERTY DRILLING & PUMP CO License No: WWC-52 Date Completed: 9/8/1966

Site Name: WALDORF HOERNER PAPER PRODUCTS COMPANY GWIC Id: 71263 Additional Lithology Records											
From	То	Description									
138	143	FINE TAN SAND AND GRAVEL									
143	145.5	FINE GRAY SAND MIXED									
145.5	160	ROCK GRAY LIMESTONE									
160	161	MUD SEAM IN ROCK									
161	162	ROCK GRAY LIMESTONE									

MONTANA WELL LOG REPORT

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Other Options

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Site Name: WA	ALDORF	HOERNER	PAPER P	RODU	CTS		Section 7: Well Test Data				
GWIC Id: 7126	64						Total Depth: 163 Static Water Level: 10.8				
Section 1: We	II Owne	r(s)					Water Temperature:				
1) WALDORF,	HOERN	ER (MAIL)									
N/A							Air Te	st *			
MISSOULA M	T 59801	[09/12/1966]					2000	an m 14	with drill stom act at fact for 24.5 hours		
									vith drill stem set at _ feet for <u>34.5</u> hours. very _ hours.		
Section 2: Loo	cation								ter level _ feet.		
Township	Rang	•	on		r Sections			•	er level <u>37.4</u> feet.		
14N	21W	/ 25			1⁄4 SW1⁄4				<u></u>		
	County			Geo	code						
MISSOULA			_		_		* Durin	ig the	well test the discharge rate shall be as uniform as		
Latitude		ngitude		ethod	Datu				s rate may or may not be the sustainable yield of the		
46.94136		4.206395	TRS		NAD			ustain	able yield does not include the reservoir of the well		
Ground Surfa		de Groun	d Surface I	Method	Datum	Date	casing				
308 Addition	8	Blo	ock		Lot		Sectio	n 8: R	emarks		
							• "				
Section 3: Pro	nosed I	Ise of Wate	r						/ell Log		
INDUSTRIAL (1)	-		•				Geologic Source				
)										
Section 4: Typ	be of Wo	ork					From	То	Description		
Drilling Method:	CABLE						0	1.5	BLACK DIRT		
Status: NEW WE	ELL						1.5	19	SAND GRAVEL COBBLESTONES AND BOULDERS WITH SOME TAN TO GRAY SILT MIXED IN		
Section 5: We	II Comp	letion Date					19	27	TAN SILT MIXED WITH GRAVEL AND COBBLESTONES		
Date well comple	eted: Mon	day, Septemb	er 12, 1966				27	41	FINE BROWN SAND MIXED WITH A FEW GRAVELS AND TAN CLAY IN THIN ALTERNATE LAYERS		
Section 6: We	II Const	ruction Deta	ails				41	53	TAN SANDY CLAY WITH SOME GRAVEL IMBEDDED		
There are no bor	rehole din	nensions assig	gned to this	well.			53	64	FINE GRAY SAND MIXED WITH TAN SILT		
Casing							94	104	GRAVEL IMBEDDED IN REDDISH TAN CLAY		
From To Dia		-	Pressure Rating	Joint	Туре		104	107	VERY FINE TAN SILTY SAND AND COARSE GRAVEL AND COBBLESTONES		
-2.5 163 18 Completion (Pe	rf/Screen]					107	110	VERY FINE TAN SILTY SAND AND COARSE GRAVEL IMBEDED IN TAN CLAY		
From To Diam	# of	Size o		iption			110	113	FINE TAN SAND MIXED WITH VERY COARSE GRAVEL AND COBBLESTONES		
109 144 18			-	SON SC			113	121	FINE TAN SAND WITH FAIRLY WELL GRADED GRAVELS		
Annular Space	(Seal/Gro	out/Packer)					121	134	FINE TAN SAND WITH WELL GRADED FINE TO COARSE GRAVELS		
There are no ani	nular spac	e records ass	igned to this	s well.			134	139	FINE TAN SAND WITH FAIRLY WELL GRADED GRAVELS		
			0				139	144	FINE TAN SAND MIXED WITH COARSE GRAVELS AND COBBLESTONES		
							144	152	FINE SAND AND COARSE GRAVEL MIXED WITH REDDISH BROWN CLAY		
							Driller	Certif	ication		
									ormed and reported in this well log is in compliance with		
									well construction standards. This report is true to the nowledge.		
								-	ame:		

Company: LIBERTY DRILLING & PUMP CO

License No: WWC-52 Date Completed: 9/12/1966

Site Name: WALDORF HOERNER PAPER PRODUCTS COMPANY										
GWIC Id: 71264 Additional Lithology Records										
										From
152	163	ROCK GRAY LIMESTONE								

MONTANA	WELL	LOG	REP	ORT
---------	------	-----	-----	-----

This well log reports the activities of a licensed Montana well driller, serves as the official record of work done within the borehole and casing, and describes the amount of water encountered. This report is compiled electronically from the contents of the Ground Water Information Center (GWIC) database for this site. Acquiring water rights is the well owner's responsibility and is NOT accomplished by the filing of this report.

Other Options

<u>Go to GWIC website</u> <u>Plot this site in State Library Digital Atlas</u> <u>Plot this site in Google Maps</u> <u>View scanned well log (11/7/2008 4:22:52 PM)</u>

the ming c		ι.								
Site Name GWIC Id: '	STONE (CONTAIN	NER COR	PORAT	ION * WI	ELL 21	Sectio	n 7: W	/ell Test Data	
DNRC Wa	ter Right:						Total Depth: 155 Static Water Level: 17 Water Temperature:			
		• •		/			vvaler	rempe	rature:	
,	CONTAIN		PORATIC	N (MAIL	_)		Air Te	-4 *		
-	RD BOX 47		40071				AIFTe	SL		
MISSOUL	A MT 5980	6 [01/03/	1997]				1800	anm w	/ith drill stem set at _ feet for <u>159</u> hours.	
0	1 4								/ery _ hours.	
Section 2:									ter level _ feet.	
Townsh	•	3	Section		Quarter Se				er level _ feet.	
14N		W	25	ç	SE¼ SE¼			5	-	
	County	/			Geocod	e				
MISSOULA							* Durin	ig the v	vell test the discharge rate shall be as uniform as	
Latituc		Longitud		Geome		Datum	possib	le. This	s rate may or may not be the sustainable yield of the	
46.9368	·31 ·	-114.1997	96	TRS-S		NAD83	well. S	ustaina	able yield does not include the reservoir of the well	
Ground S	Surface Altit	tude	Ground Su	urface Me	ethod I	Datum Date	casing	-		
Addition			Block		L	.ot	Sectio	n 8: R	emarks	
	-						Sectio	n 9: W	/ell Log	
	Proposed		Water				Geolo	gic So	urce	
	ECTION (1)						112AL	√M - A	LLUVIUM (PLEISTOCENE)	
INDUSTRIA	L (2)							То	Description	
• • • • • •	-									
	Type of W						0	0.5	SANDY SOIL	
0	nod: CABLE	ROTARY					0.5	26	GRAVEL AND COBBLESTONES MIXED IN MED TO COARSE TAN SILTY SAND MATRIX	
Status: NEV	V WELL									
	Well Com	-		7			26	63	SCATTERED SMALL GRAVEL MIXED IN FINE TO MED TAN SILTY SAND MATRIX-SEEPS OF SILTY SANDY WATER	
	mpleted: Fri	-	-	I			63	91	GRAVEL AND COBBLESTONES MIXED IN FINE TO MEE TAN SILTY SAND MATRIX	
	Well Con						91	98	SMALL TO MED GRAVEL EMBEDDED IN TAN CLAY	
	o borehole d	limensions	s assigned	to this we	ell.				SCATTERED SMALL TO MED GRAVEL MIXED IN FINE T	
		Wall	Press			7	98	104	MED TAN SILTY SAND MATRIX SEEPS OF SILTY SAND WATER	
-3 114	18	Thicknes	s Rating) JOII	nt Type STEEL		104	109	GRAVEL AND COBBLESTONES MIXED IN FINE TO MEE TAN CLAY-SEEPS OF SILTY SANDY WATER	
141 155 Completion	16 (Perf/Scre	en)			STEEL		109	111	GRAVEL EMBEDDED IN BROWN SILTY SANDY CLAY MATRIX	
			Size of			7	111	141	GRAVEL AND COBBLESTONES MIXED IN SAND-WATE	
From To	Diameter O			Descrip	tion		141	155	GREEN CLAY	
113 116				· ·	T SCREE	N				
116 126					T SCREE				1	
126 136					T SCREE					
136 141					SCREEN					
				I.1 OLUI	JUNEEN	<u></u>				
Annular Sp	ace (Seal/G	Cont.	ker)						 	
Erom	escription								ication	
	-								ormed and reported in this well log is in compliance w	
0 20 B	ENTONITE								well construction standards. This report is true to the	
							Dest of	-	owledge.	
									ime:	
								Compa	any: LIBERTY DRILLING & PUMP CO	

License No: WWC-458 Date Completed: 1/3/1997

kv Well

MONTANA WELL LOG REPOR

This well log reports the activities of a licensed Montana well driller, serves as the official record of work done within the borehole and casing, and describes the amount of water encountered. This report is compiled electronically from the contents of the Ground Water Information Center (GWIC) database for this site. Acquiring water rights is the well owner's responsibility and is NOT accomplished by the filing of this report.

Other Options

Go to GWIC website Plot this site in State Library Digital Atlas Plot this site in Google Maps View scanned well log (11/7/2008 3:55:57 PM)

Site Name: GU GWIC Id: 7123		NARD A.			Section 7: Well Test Data
Section 1: Wel 1) GURSKY, BE		IAIL)			Total Depth: 35 Static Water Level: 30 Water Temperature:
					Unknown Test Method *
Section 2: Loc	ation				Yield <u>0.1</u> gpm.
Township	Range	Section	Quarter	Sections	Pumping water level _ feet.
14N	21W	24			Time of recovery _ hours.
(County		Geoc	ode	Recovery water level _ feet.
MISSOULA	_				
Latitude	Longi	itude	Geomethod	Datum	* During the well test the discharge rate shall be as uniform as
46.957653	-114.19	98495	TRS-SEC	NAD83	possible. This rate may or may not be the sustainable yield of the
Ground Surface Altitude Ground Surface Method		Datum Date			
				casing.	
Addition		Block		Lot	
					Section 8: Remarks
Section 3: Pro	posed Use	of Water			Section 9: Well Log
DOMESTIC (1)					Geologic Source
					111ALVM - ALLUVIUM (HOLOCENE)
Section 4: Typ	e of Work				Lithology Data
Drilling Method:					Linoigy Dua
Status: NEW WE	LL				There are no lithologic details assigned to this well.
					Driller Certification
Section 5: Wel	-				All work performed and reported in this well log is in compliance with
Date well complete	ted: Tuesday,	, January 1, 1	1946		the Montana well construction standards. This report is true to the best of my knowledge.
Section 6: Wel	I Construct	tion Details	;		Name:
There are no bore	ehole dimens	ions assigne	d to this well.		
There are no casi	ing strings as	signed to this	s well.		Company:
There are no com	pletion recor	ds assigned	to this well.		License No: -
Annular Space (Seal/Grout/P	acker)			Date Completed: 1/1/1946

There are no annular space records assigned to this well.

Hoffman Construction Well

MONTANA WELL LOG REPORT

This well log reports the activities of a licensed Montana well driller, serves as the official record of work done within the borehole and casing, and describes the amount of water encountered. This report is compiled electronically from the contents of the Ground Water Information Center (GWIC) database for this site. Acquiring water rights is the well owner's responsibility and is NOT accomplished by the filing of this report.

Other Options

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Site Name: CHAMPION INTERNATIONAL GWIC Id: 71239

Section 1: Well Owner(s)

1) CHAMPION INTERNATIONAL (MAIL) DRAWER D MISSOULA MT 59806 [09/09/1980]

Section 2: Location

Township	Range	Section	Quarter	Sections	
14N	21W	24	NW¼ NE¼		
(County		Geoc	ode	
MISSOULA					
Latitude	Longi	tude	Geomethod	Datum	
46.963184	-114.19	5863	TRS-SEC	NAD83	
Ground Surfac	e Altitude	Ground S	urface Method	Datum Date	
Addition		Block		Lot	

Section 3: Proposed Use of Water

INDUSTRIAL (1)

Section 4: Type of Work

Drilling Method: FOWARD ROTARY Status: NEW WELL

Section 5: Well Completion Date

Date well completed: Tuesday, September 9, 1980

Section 6: Well Construction Details

There are no borehole dimensions assigned to this well.

From	то	Diameter	- 1	Wall Thickness		Pressure Rating		Joint	Туре	
-2	158	3 6							STEEL	
Comp	letio	n (Perf/Sc	ree	en)		-		-	-	
			#	of	Size of					
From	То	Diameter	0	penings	gs Openings		De	Description		
158	158	6					OF	PEN BO	* MOTTO	
Annul	ar S	pace (Seal	/G	rout/Pac	ker	r)				
From	То	Descriptio	n	Cont. Fed?						
7	20	BENTONIT	Έ							

Section 7: Well Test Data

Total Depth: 158 Static Water Level: 22 Water Temperature:

Unknown Test Method *

Yield <u>100</u> gpm. Pumping water level <u>158</u> feet. Time of recovery _ hours. Recovery water level _ feet.

* During the well test the discharge rate shall be as uniform as possible. This rate may or may not be the sustainable yield of the well. Sustainable yield does not include the reservoir of the well casing.

Section 8: Remarks

MILL OPERATION/PACKAGING DIVISION

Section 9: Well Log

Geologic Source

112ALVM - ALLUVIUM (PLEISTOCENE)

From	То	Description
0	2	SAND AND GRAVEL
2	12	CLAY SAND AND GRAVEL
12	22	CLAY SAND GRAVEL AND WATER
22	36	SAND AND WATER
36	44	TAN CLAY
44	73	SAND AND WATER
73	96	TAN CLAY
96	139	SAND AND WATER
139	147	CLAY SMALL GRAVEL SAND AND WATER
147	158	SAND GRAVEL AND WATER

Driller Certification

All work performed and reported in this well log is in compliance with the Montana well construction standards. This report is true to the best of my knowledge.

Name: Company: CAMP WELL DRILLING License No: WWC-7

Date Completed: 9/9/1980

Fairbanks Ranch House

MONTANA WELL LOG REPORT

This well log reports the activities of a licensed Montana well driller, serves as the official record of work done within the borehole and casing, and describes the amount of water encountered. This report is compiled electronically from the contents of the Ground Water Information Center (GWIC) database for this site. Acquiring water rights is the well owner's responsibility and is NOT accomplished by the filing of this report.

Other Options

<u>Go to GWIC website</u> <u>Plot this site in State Library Digital Atlas</u> <u>Plot this site in Google Maps</u>

Site Name: STONE CONTAINER GWIC Id: 706500

Section 1: Well Owner(s)

Section 2: Location

Township	Range	Section	Quarter S	ections	
14N	21W	25	SE¼ SE¼ N	E¼ SW¼	
	County		Geoc	ode	
MISSOULA					
Latitude	Longitud	le	Geomethod	Date	um
46.94	-114.197	2	MAP	NAC)27
Ground Surfa	ace Altitude	Ground	Surface Method	Datum	Date
305	55				
Addition		Bloc	k	Lot	

Section 3: Proposed Use of Water

UNUSED (1)

Section 4: Type of Work

Drilling Method: Status: NEW WELL

Section 5: Well Completion Date

Date well completed: Wednesday, January 1, 1997

Section 6: Well Construction Details

There are no borehole dimensions assigned to this well. **Casing**

			-	Pressure		
From	То	Diameter	Thickness	Rating	Joint	Туре
-3.5	125	6				STEEL

There are no completion records assigned to this well. Annular Space (Seal/Grout/Packer)

There are no annular space records assigned to this well.

Section 7: Well Test Data

Total Depth: 125 Static Water Level: Water Temperature:

Unknown Test Method *

Yield _ gpm. Pumping water level _ feet. Time of recovery _ hours. Recovery water level _ feet.

* During the well test the discharge rate shall be as uniform as possible. This rate may or may not be the sustainable yield of the well. Sustainable yield does not include the reservoir of the well casing.

Section 8: Remarks

Section 9: Well Log Geologic Source 112ALVM - ALLUVIUM (PLEISTOCENE) Lithology Data

There are no lithologic details assigned to this well.

Driller Certification

All work performed and reported in this well log is in compliance with the Montana well construction standards. This report is true to the best of my knowledge.

Name: Company: License No: -Date Completed: 1/1/1997

Log Chipper Well

MONTANA WELL LOG REPORT

This well log reports the activities of a licensed Montana well driller, serves as the official record of work done within the borehole and casing, and describes the amount of water encountered. This report is compiled electronically from the contents of the Ground Water Information Center (GWIC) database for this site. Acquiring water rights is the well owner's responsibility and is NOT accomplished by the filing of this report.

Other Options

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-	-								
Site Name: H GWIC Id: 712	-	R WALD	ORF INC				Sectio	n 7: W	/ell Test Data
DNRC Water Section 1: We	Right: 1							Water I	158.5 Level: 25 erature:
							valei	Tempe	
1) WALDORF, DRAWER D		,	,				Air Te	st *	
MISSOULA M	11 59801	[01/31/1	977]				00		duill store ast at fast far O haves
Section 2: Lo	cation						Time c	f recov	n drill stem set at _ feet for <u>2</u> hours. /ery _ hours.
Township	Ran	ge S	Section	Qua	arter Sec	tions			ter level _ feet.
14N	21\	N	13	1	NE¼ SW	1/4	Pumpi	ng wat	er level <u>155</u> feet.
	County			G	Geocode				
MISSOULA	,						* •		
Latitude		_ongitude		Geometh	od	Datum			well test the discharge rate shall be as uniform as
46.970438		114.20118		TRS-SE		NAD83			s rate may or may not be the sustainable yield of the
									able yield does not include the reservoir of the well
Ground Surf	ace Altiti	lae G	round Sur	race Meth	iod Da	atum Date	casing	-	
Addition			Block		Lo	t	Sectio	n 8: R	emarks
	_						Sectio	n 9: W	/ell Log
Section 3: Pro	-	Use of V	Vater				Geolo	aic So	urce
INDUSTRIAL (1)								LLUVIUM (PLEISTOCENE)
Section 4: Ty	pe of W	ork					From		Description
Drilling Method:	FOWAR	D ROTAR	Y				0	39	CLAY SAND AND GRAVEL
Status: NEW W	ELL						39	43	SAND GRAVEL AND WATER
							43	138	SAND AND WATER
Section 5: We	ell Com	oletion D	ate				138	154	SMALL GRAVEL SAND AND WATER
Date well compl	leted: Mo	nday, Janu	uary 31, 197	77			154		GRAVEL SAND AND WATER
Section 6: We	ell Cons	truction	Details						
There are no bo	orehole di	mensions	assigned to	this well.					
Casing		-				-			
		Wall	Pressu	re					
From To D	liameter	Thicknes	ss Rating	Joint	Туре				
-2 158.5 6					STEEL	1			
Completion (Pe	erf/Scree	n)				-1			
	-	t of	Size of			1			
From To Di		-	Openings	Descript	ion				
158.5 158.5 6				OPEN B	OTTOM *	*			
Annular Space	(Seal/Gr	out/Packe	n 1	101 211 2		_1	Driller	Certif	ication
Annular Space	(Seal/O	ouuracke	51)						prmed and reported in this well log is in compliance with
There are no an	nular spa	ce record	s assigned	to this we	II.				well construction standards. This report is true to the
	•		5						nowledge.
								-	
								Na	ime:
								Compa	any: CAMP WELL DRILLING

License No: WWC-7 Date Completed: 1/31/1977

New Peterson Dairy Farm

MONTANA WELL LOG REPORT

This well log reports the activities of a licensed Montana well driller, serves as the official record of work done within the borehole and casing, and describes the amount of water encountered. This report is compiled electronically from the contents of the Ground Water Information Center (GWIC) database for this site. Acquiring water rights is the well owner's responsibility and is NOT accomplished by the filing of this report.

Other Options

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-								
Site Name: WA GWIC Id: 7122		DERNER			Sectio	n 7: W	/ell Test Data	
DNRC Water F	-				Total Depth: 163 Static Water Level: 18			
Section 1: We	II Owner(s)				Water	Tempe	arature:	
1) WALDORF, I DRAWER D	HOERNER	(MAIL)			Air Te	st *		
MISSOULA MT	r 59801 [06/:	24/1976]						
		-					drill stem set at _ feet for <u>1</u> hours.	
Section 2: Loc	ation						very _ hours.	
Township	Range	Section	Quarter	Sections			ter level _ feet. er level <u>60</u> feet.	
14N	21W	13	NW ¹ ⁄4	NW1⁄4	Fumpi	ny wat		
	County		Geoc	ode				
MISSOULA					* Durin	ig the v	well test the discharge rate shall be as uniform as	
Latitude 46.977675	Long i -114.20		Geomethod TRS-SEC	Datum NAD83	possible. This rate may or may not be the sustainable yiel			
Ground Surfa	ce Altitude	Ground S	urface Method	Datum Date				
Addition		Block		Lot	Sectio	n 8: R	emarks	
Section 2: Bro		of Wator					/ell Log	
Section 3: Pro DOMESTIC (1)	poseu ose	Of Water			Geolo	-		
DOMESTIC (1)					112AL	VM - A	LLUVIUM (PLEISTOCENE)	
Section 4: Typ	e of Work				From	То	Description	
Drilling Method: F		TARY			0	2	BLACK DIRT	
Status: NEW WE					2	8	SANDY CLAY	
					8	16	SAND AND GRAVEL	
Section 5: We	-				16	139	SAND AND WATER WITH SEAMS OF SILTY CLAY	
Date well comple	eted: Thursday	y, June 24, 19	76		139	157	SMALL GRAVEL SAND AND WATER	
Section 6: We	II Construct	tion Dotaile			157	163	LARGE GRAVEL SAND AND WATER	
There are no bor			to this well					
Casing		ions assigned	to this well.					
	Wall	Pressu	ıre					
From To Dian	neter Thickr	ness Rating	Joint Type					
-2.3 163 6			STEE	iL .				
Completion (Per	rf/Screen)	-						
	# of	Size of						
From To Diam	eter Opening	gs Openings						
163 163 6			OPEN BOTTON	Л *				
Annular Space ((Seal/Grout/P	acker)					ication	
There are no ann	ular space re	cords assigne	ed to this well.		All work performed and reported in this well log is in compliance with the Montana well construction standards. This report is true to the best of my knowledge.			
						Comp	any: CAMP WELL DRILLING	

License No: WWC-239 Date Completed: 6/24/1976

Original Peterson Dairy Farm

MONTANA WELL LOG REPORT

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Other Options

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Site Name: PETERSEN BOB AND MARY L GWIC Id: 71215					Section 7: Well Test Data			
Section 1: We	ell Owner(s))epth: 1 Water I	146 Level: 35	
1) PETERSEN		r.L (MAIL)			Water	Tempe	erature:	
	-,	()			Air Te	st *		
Section 2: Lo							i drill stem set at _ feet for <u>2.5</u> hours. /ery _ hours.	
Township	Range	Section	Quarter	Sections			ter level _ feet.	
14N	21W	11	SE ¹ / ₄				er level _ feet.	
	County		Geoco	ode		5		
MISSOULA								
Latitude	Longi		Geomethod	Datum	* Durir	ng the v	vell test the discharge rate shall be as uniform as	
46.981448	-114.21		TRS-SEC	NAD83	possib	le. This	s rate may or may not be the sustainable yield of the	
Ground Surfa	ace Altitude	Ground S	urface Method	Datum Date	well. S casing		able yield does not include the reservoir of the well	
Addition		Block		Lot	3			
					Sectio	n 8: R	emarks	
					WATEF		RING WELL IN GRAVEL BELOW 146 FEET	
Section 3: Pro	oposed Use	of Water						
STOCKWATER	(1)				Sectio	n 9: W	/ell Log	
						gic So	-	
Section 4: Ty	pe of Work					-	LLUVIUM (PLEISTOCENE)	
Drilling Method:	AIR ROTARY				From		Description	
Status: NEW W	ELL						•	
					0		SAND AND GRAVEL	
Section 5: We	ell Completio	on Date			20		SAND WITH THIN CLAY SEAMS	
Date well compl	eted: Friday, N	ovember 3, 19	972		135	146	SAND GRAVEL WITH WATER	
Section 6: We								
There are no bo	rehole dimensi	ions assigned	to this well.					
Casing				-				
	Wall	Pressu						
From To Dia	meter I nickn	ness Rating		_				
-1 146 6			STEE	L				
Completion (Pe				_				
	# of	Size of						
	neter Opening	gs Openings	Description					
146 146 6			OPEN BOTTON	1 *				
Annular Space	(Seal/Grout/P	acker)				<u> </u>		
There are no an		aarda aaaigna	d to this wall		Driller	l O o untif		
There are no an	nular space re	cords assigne	a to this well.				ication	
							prmed and reported in this well log is in compliance with	
							well construction standards. This report is true to the	
					Dest 0	· ·	nowledge.	
							ime:	
					1	Compa	any: JEROMES DRILLING CO	

License No: WWC-8

Date Completed: 11/3/1972

Peterson Feedlot

MONTANA WELL LOG REPORT

This well log reports the activities of a licensed Montana well driller, serves as the official record of work done within the borehole and casing, and describes the amount of water encountered. This report is compiled electronically from the contents of the Ground Water Information Center (GWIC) database for this site. Acquiring water rights is the well owner's responsibility and is NOT accomplished by the filing of this report.

Other Options

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Site Name: LOISELLE VICTOR GWIC Id: 71221

Section 1: Well Owner(s)

1) LOISELLE, VICTOR (MAIL)

Section 2: Location

Township	Range	Section	Quarter Sections			
14N	21W	13	NW ¹ ⁄ ₄			
(County		Geoc	ode		
MISSOULA						
Latitude	Longi	tude	Geomethod	Datum		
46.975866	-114.20	3848	TRS-SEC NAD83			
Ground Surface	e Altitude	Ground S	urface Method	Datum Da		

Addition Block

Section 3: Proposed Use of Water

DOMESTIC (1) STOCKWATER (2)

Section 4: Type of Work

Drilling Method: Status: NEW WELL

Section 5: Well Completion Date

Date well completed: Saturday, January 1, 1955

Section 6: Well Construction Details

There are no borehole dimensions assigned to this well. Casing

From	То		Wall Thickness	Pressure Rating	Joint	Туре
0	161	6				

There are no completion records assigned to this well. Annular Space (Seal/Grout/Packer)

There are no annular space records assigned to this well.

Section 7: Well Test Data

Total Depth: 161 Static Water Level: 20 Water Temperature:

Unknown Test Method *

Yield <u>50</u> gpm. Pumping water level _ feet. Time of recovery _ hours. Recovery water level _ feet.

* During the well test the discharge rate shall be as uniform as possible. This rate may or may not be the sustainable yield of the ate well. Sustainable yield does not include the reservoir of the well casing.

Section 8: Remarks

Lot

Section 9: Well Log Geologic Source 112ALVM - ALLUVIUM (PLEISTOCENE)

From		Description
0	161	GRAVEL AND QUICKSAND

Driller Certification

Г

All work performed and reported in this well log is in compliance with the Montana well construction standards. This report is true to the best of my knowledge.

Name:	
Company:	
License No: -	
ate Completed: 1/1/1955	

Timber Products Office Well

MONTANA WELL LOG REPORT

This well log reports the activities of a licensed Montana well driller, serves as the official record of work done within the borehole and casing, and describes the amount of water encountered. This report is compiled electronically from the contents of the Ground Water Information Center (GWIC) database for this site. Acquiring water rights is the well owner's responsibility and is NOT accomplished by the filing of this report.

Other Options

<u>Go to GWIC website</u> <u>Plot this site in State Library Digital Atlas</u> <u>Plot this site in Google Maps</u> <u>View scanned well log (11/7/2008 3:19:05 PM)</u>

Site Name: ST GWIC Id: 1659		AINER			Sectio	n 7: W	lell Test Data	
Section 1: Well Owner(s)					Total Depth: 154 Static Water Level: 28			
1) STONE CON PO BOX 4707	NTAINER (M	AIL)			Water	Tempe	rature:	
MISSOULA MT	59806 [02/	18/1998]			Air Te	st *		
Section 2: Loc	ation						drill stem set at _ feet for <u>1</u> hours.	
Township	Range	Section	Quarter	Sections	Time of recovery hours.			
14N	21W	13	NW1/	SE1/4			ter level _ feet.	
	County		Geoco	ode	Pumping water level <u>68</u> feet.		er level <u>68</u> feet.	
MISSOULA								
Latitude	Longi	tude	Geomethod	Datum	* Durin	a the v	vell test the discharge rate shall be as uniform as	
46.970438	-114.19	95873	TRS-SEC	NAD83			s rate may or may not be the sustainable yield of the	
Ground Surfa	ce Altitude	Ground S	urface Method	Datum Date				
Addition		Block		Lot	casing			
Addition		DIOCK		201	Section 8: Remarks			
Section 3: Pro	posed Use	of Water			Contin	- 0. W		
DOMESTIC (1)					Section 9: Well Log Geologic Source			
()								
Section 4: Typ	e of Work						LLUVIUM (PLEISTOCENE)	
Drilling Method: F	ROTARY				From	То	Description	
Status: NEW WE	LL				0	7	TOPSOIL GRAVEL	
					7	10	BROWN CLAY	
Section 5: Wel					10	27	BROWN CLAY GRAVEL	
Date well comple	ted: Wednesd	lay, February	18, 1998		27	57	SAND WATER	
					57	60	BROWN CLAY SAND	
Section 6: Well Construction Details					60	150	SAND WATER WITH SOME GRAVEL	
There are no borehole dimensions assigned to this well.			150	154	SAND WATER GRAVEL			
Casing	Wall	Desses		-				
From To Diam		Pressu less Rating						
	leter Thickn	less Rating						
-1.5 154 6			STEE	:L				
Completion (Per				_				
From To Diam	# of eter Opening	Size of s Openings	Description					
154 154 6	- <u> ·</u> -•	<u> </u>	OPEN BOTTON	1 *				
Annular Space (Seal/Grout/P	acker)	OF ER DOTTOR	<u>.</u>				
	Cont.	acker			Driller	Certifi	ication	
From To Description Fed?					All work performed and reported in this well log is in compliance with			
0 20 BENT					the Montana well construction standards. This report is true to the			
							owledge.	
						Na	me:	

Name: Company: CAMP WELL DRILLING License No: WWC-7 Date Completed: 2/18/1998

Waste Fuel Boiler Well

MONTANA WELL LOG REPORT

This well log reports the activities of a licensed Montana well driller, serves as the official record of work done within the borehole and casing, and describes the amount of water encountered. This report is compiled electronically from the contents of the Ground Water Information Center (GWIC) database for this site. Acquiring water rights is the well owner's responsibility and is NOT accomplished by the filing of this report.

Other Options

<u>Go to GWIC website</u> <u>Plot this site in State Library Digital Atlas</u> <u>Plot this site in Google Maps</u> <u>View scanned well log (11/7/2008 3:57:51 PM)</u>

Site Name: HO GWIC Id: 7124		LDORF			Sectio	n 7: W	/ell Test Data	
01110 10. / 124	•				Total D			
Section 1: Wel	l Owner(s)				Static V	Water	Level: 24	
1) CHAMPION DRAWER D	INTERNATIO	ONAL (MAIL	_)		Water	Tempe	erature:	
MISSOULA MT	59806 [07/2	5/1978]			Air Tes	st *		
Section 2: Loc	ation						n drill stem set at _ feet for <u>6</u> hours.	
Township	Range	Section	Quarter	Sections	Time of recovery _ hours.			
14N	21W	24	SW1⁄4 N\	N¼ NE¼		,	ter level _ feet.	
(County		Geoco	ode	Pumpi	ng wai	er level <u>134</u> feet.	
MISSOULA								
Latitude	Longit	ude	Geomethod	Datum	* During the well test the discharge rate shall be as uniform a			
46.962262	-114.19	7179	TRS-SEC	NAD83			s rate may or may not be the sustainable yield of the	
Ground Surfac	e Altitude	Ground Su	urface Method	Datum Date				
					casing.			
Addition		Block Lot						
					Section 8: Remarks			
Section 3: Pro	posed Use o	of Water			Sectio	n 9: W	/ell Log	
DOMESTIC (1)					Geologic Source			
INDUSTRIAL (2)					112AL\	/M - A	LLUVIUM (PLEISTOCENE)	
Section 4: Tun	o of Work				From	То	Description	
Section 4: Type Drilling Method: C					0	-	HARD PACKED TAN GRAY CLAYISH SOIL	
Status: NEW WEI					2		TAN GRAY DIRT SAND SMALL GRAVELS AND COBBLE	
					10		SPONGY SILTY SAND FIRST WATER	
Section 5: Well Completion Date					23		GRAVELS MIXED IN TAN CLAY	
Date well completed: Tuesday, July 25, 1978				38		SILTY TAN GRAY SAND FEW SMALL GRAVELS SEEP		
,,, _,, _					47		SANDY REDDISH TAN CLAY	
Section 6: Wel	l Constructi	on Details			50		BROWN SANDY CLAY SEEP	
There are no bore	hole dimension	ons assigned	to this well.		68		FINE TAN SILTY SAND	
Casing					81		TAN CLAY FINE SAND	
	Wall	Pressu			91.5			
	eter Thickne	ess Rating	Joint Type	_			CEMENTED SILTY FINE TAN SAND SEEPING	
-1.8 144 6			STEE	iL	102		SCATTERED GRAVELS IN FINE SILTY SAND	
Completion (Per		-			120		GRAVELS IN SILTY SAND	
	# of	Size of	L		122	124	FINE TO COARSE SAND SMALL AMOUNT OF WATER	
From To Diamo	eter Opening	s Openings	Description OPEN BOTTON	1 *	124	131	SILTY FINE TO COARSE SAND SMALL AMOUNT OF WATER	
Annular Space (Seal/Grout/P	l acker)		··]	131	132	SILTY FINE SAND SMALL GRAVELS	
		ont.			Driller	Certif	ication	
					All wor	k perfo	ormed and reported in this well log is in compliance v	
FromIToIDescri								
From To Descri	-	<u>.</u>					well construction standards. This report is true to the	

Name: Company: LIBERTY DRILLING & PUMP CO

License No: WWC-52

Date Completed: 7/25/1978

5/14/2019

Waste Fuel Boiler Well

Site Name: HOERNER WALDORF GWIC Id: 71241 Additional Lithology Records							
From	То	Description					
132	139	SILTY FINE TO COARSE SAND SMALL AMOUNT OF WATER					
139 144		CLEAN COARSE SAND GRAVELS COBBLES BOULDERS BOTTOM STABLE WATER					

5/14/2019

Wastewater Clarifier Well

MONTANA WELL LOG REPORT

This well log reports the activities of a licensed Montana well driller, serves as the official record of work done within the borehole and casing, and describes the amount of water encountered. This report is compiled electronically from the contents of the Ground Water Information Center (GWIC) database for this site. Acquiring water rights is the well owner's responsibility and is NOT accomplished by the filing of this report.

Other Options

<u>Go to GWIC website</u> <u>Plot this site in State Library Digital Atlas</u> <u>Plot this site in Google Maps</u> <u>View scanned well log (11/7/2008 3:56:04 PM)</u>

Site Name: HO GWIC Id: 71236		LDORF		Sectio	n 7: W	/ell Test Data			
Section 1: Well 1) HOERNER, \	Owner(s)	(MAIL)			Total D Static \ Water	Nater I	Level: 27		
N/A MISSOULA MT	59801 [06/2	24/1970]			Air Tes	st *			
Section 2: Loca	ation						th drill stem set at _ feet for <u>5</u> hours.		
Township	Range	Section	Quarter	Sections			/ery _ hours. ter level _ feet.		
14N	21W	24					er level <u>32</u> feet.		
(County		Geoc	ode					
MISSOULA									
Latitude	Longi	tude	Geomethod	Datum	* Durin	g the v	well test the discharge rate shall be as uniform as		
46.957653	-114.19	98495	TRS-SEC	NAD83	possib	le. This	s rate may or may not be the sustainable yield of the		
Ground Surfac	e Altitude	Ground St	urface Method	Datum Date			able yield does not include the reservoir of the well		
		.			casing				
Addition		Block		Lot	Santia		omorko		
					Sectio	II 0. K	emarks		
Section 3: Prop	oosed Use	of Water			Sectio	n 9: W	/ell Log		
INDUSTRIAL (1)					Geologic Source				
						-	LLUVIUM (PLEISTOCENE)		
Section 4: Type	e of Work								
Drilling Method: C	HURN				From		Description		
Status: NEW WEI	-L				0		GRAVEL AND BROWN CLAY		
Contine E. Wall	Completie	n Dete			3				
Section 5: Well	-		1070		23		SANDY CLAY AND WATER		
Date well complet	ea: vveanesc	ay, June 24,	1970		32		SAND AND CLAY		
Section 6: Well	Construct	ion Dotaile			58		SMALL GRAVEL AND WATER		
There are no bore			to this well		60		TAN CLAY		
Casing		ions assigned	to this well.		62		SAND AND WATER		
	Wall	Pressu	re l		77	79	SANDY CLAY		
From To Diar		ness Rating	Joint Type		79	138	SILTY SAND AND WATER		
-1.5 168.5 6			STEEL		138	165	SAND GRAVEL AND WATER		
Completion (Per	f/Screen)		1 1	1	165	168.5	TAN CLAY		
	# of	Size of							
From To Diam	eter Openin	gs Openings	Description						
152 162 6			3/8X3 KNIFE						
Annular Space (Seal/Grout/P	acker)					<u> </u>		
There are no	lar anaga	oordo ooolaraa	d to this wall				ication		
There are no ann	uar space re	cords assigne	u to this well.				ormed and reported in this well log is in compliance w		
							well construction standards. This report is true to the		
					best of	my kn	owledge.		

Name: Company: CAMP WELL DRILLING License No: WWC-7 Date Completed: 6/24/1970

APPENDIX E FIELD FORMS AND CHAIN-OF-CUSTODY FORMS



	FIELD FORMS								
#	Description								
I	Daily Field Record								
2	Test Pit Field Form								
3	Soil Boring Log								
4	Monitoring Well Installation Record								
5	Monitoring Well Completion and Lithology Log								
6	Groundwater Sampling and/or Development Form								
7	Photo Log								
8	Incident Report Form								
9	Pace Analytical – Chain of Custody								
10	Frontier Labs – Chain of Custody								
Н	Field Investigation Form								

DAILY FIELD RECORD



Page____ of ____

Project and	Task Number:		Date:						
Project Name:			Field Activity:						
Location:			Weather:						
Personnel:	Name		Comp	bany	Time in	Time Out			
PERSONA	SAFETY CHECKLIST								
	Steel-toed boots		Hard Hat		Traffic Vest				
	Gloves		Safety Goggles		Ear Protection	1			
TIME		DESC	SCRIPTION OF WORK PERFORMED						

DAILY FIELD RECORD



Page____ of ____

Date:_____

TIME	DESCRIPTION OF WORK PERFORMED

-	New	Fields		Pit ID:			
	Project:			Project #:			
Р				Date:			
			I	Logged by:			
				Pit Depth:			
			Backfilled:				
	Sample	Pit Wall Profile					
Depth	(depth & type)	Profile of face (refer to plan view of pit below): Profile Width =	Description	Additional Notes			
	<u> </u>						
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F							
	egend:		Plan View of Pit: (include v	width, length, and North direction)			
SD	Small disturbe						
LD ST	Large disturbe	d sample be sample (vert / horz.)					
BL	Block sample						
ρ	In-situ density						
ω	Water content Water table er						

NewFields

PROJECT:				PROJECT NO:	BORING NO:						
LOCATION OF BORING							DRILLING METHOD:	DRILLING CONTRACTOR:			
								SAMPLE METHOD:	DRILLER:		
								SAMPLER(S)/LOGGER(S):			
								START DATE/TIME:	RIG/EQUIPMENT:		
								TOTAL BOREHOLE DEPTH:	FINISH DATE/TIME:		
								WATER LEVEL/TIME/DATE:	CASING DEPTH:		
		CAN	IPLE					SOIL DESCRIPTION	COMMENTS		
			IPLE		-			SOIL DESCRIPTION	CONNIVIENTS		
SAMPLE TYPE	INCHES DRIVEN	INCHES RECOVERED	SAMPLE NO.	SAMPLE DEPTH	PID READING	DEPTH IN FEET	ΓΙΣΗΟΓΟϾλ	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	OBSERVATIONS (ODOR, STAINING, DRILLING RATE, DRILLING ISSUES, ETC.)		
						_					
						1					
						2					
						3					
						4					
						4					
						_					
						5					
						6					
						7					
						8					
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MONITORING WELL INSTALLATION RECORD

MONITORING WELL	SURFACE CON		
MONITORING WELL NO .:	FLUSH MOUNT		TOC ELEVATION:
PROJECT:	ABOVE GROUND WITH	BUMPER POST	GROUND SURFACE ELEVATION:
SITE:		ASPHALT	Northing:
BOREHOLE NO.:			EASTING:
WELL PERMIT NO.:			DATE SURVEYED:
TOC TO BOTTOM OF WELL:			SURVEY CO.:
DRILLING INFORMATION			ANNULAR SEAL
DRILLING BEGAN:		TOP OF CASING	VOLUME CALCULATED:
DATE: TIME:		(FEET ABOVE GROUND SURFACE)	AMOUNT USED:
WELL INSTALLATION BEGAN:	0000	SURFACE)	GROUT FORMULA (PERCENTAGES)
DATE: TIME:			PORTLAND CEMENT:
WELL INSTALLATION FINISHED:			BENTONITE:
DATE: TIME:		0010	WATER:
DRILLING CO.:			
DRILLER:			PRODUCT:
LICENSE:	DEPTH BGS		MFG. BY:
DRILL RIG:			METHOD INSTALLED:
DRILLING METHOD:			
HOLLOW STEM AUGER			
□ AIR ROTARY			
OTHER:			
DIAMETER OF AUGERS:			
ID: OD:			BENTONITE SEAL
WELL CASING		/	VOLUME CALCULATED:
WELL CASING			AMOUNT USED:
SCHEDULE 40 PVC			PELLETS, SIZE:
PRODUCT:			OTHER:
MFG. BY:	DEPTH BGS		PRODUCT:
CASING DIAMETER:			MFG. BY:
ID: OD:			METHOD INSTALLED:
LENGTH OF CASING (TOTAL):		◄	POURED TREMIE
*NOTE: IF CASING SEGMENTS OF VARYING		DEPTH BGS	OTHER:
LENGTH ARE USED, RECORD ALL SEGMENT		*AFTER FILTER PACK HAS BEEN SURGED	AMOUNT OF WATER USED:
WELL SCREEN			
SCHEDULE 40 PVC			FILTER PACK
			PREPACKED FILTER
PRODUCT:			VOLUME CALCULATED:
MFG. BY:			AMOUNT USED:
CASING DIAMETER:			SAND, SIZE:
ID: OD:			PRODUCT:
SLOT SIZE:			MFG. BY:
LENGTH OF SCREEN:			METHOD INSTALLED:
			OTHER:
BOREHOLE BACKFILL			WATER LEVEL:
AMOUNT CALCULATED:			(BTOC AFTER WELL NSTALLATION)
AMOUNT USED:			CENTRALIZERS USED?
BENTONITE CHIPS, SIZE:		DEPTH BGS	
BENTONITE PELLETS, SIZE:			CENTRALIZER DEPTHS:
SLURRY:			
GRAATION COLLAPSE:		SUMP	
OTHER:	X	DEPTH BGS	BGS – BELOW GROUND SURFACE
PRODUCT:	×		BTOC – BELOW TOP OF CASING
MFG. BY:			N/A – NOT APPLIC ABLE
METHOD INSTALLED:			NR – NOT RECORDED
POURED TREMIE	DEPTH BGS	I	TOC – TOP OF CASING





JOB NO:						WELL NO:	
PROJECT:			STATE:		COUNTY:	LOGGED B	Y:
LEGAL LOCATION			DESCRIPTIVE LOC	CATION:			
T R	S	TRACT					
DATE STARTED:			DATE COMPLETED:		DRILLING CO/ DRILLER:		
STARTED.		_	COWFEETED.		DRILLER.		
DRILLING METHOD			Borehole DIAM (IN):		DRILL FLUIDS USED:		
TOTAL DEPTH		TOTAL DEPTH	INTERVAL PERFO	RATED FROM		DIAMETER	
DRILLED:		CASED:	OR SCREENED (F	Г:)		CAS NG TYP	E:
METHOD OF		0	DURING WELL CO			YES	NO
PERFORATION:		Open Hole Open Bottom		Well Develope Well Pumped	D.		
		Saw Slotted		Water Sample	s Collected		
		Factory (size)		Material Samp	les Collected		
		Other: Roller Perf tool 1/2	2" x 1"; 4 rows				
		HARACTERISTICS					
WELL PROTECT		LENGTH:		SURFACE SE	AL TYPE:	FROM:	TO:
		DIAM:		BACKFILL MA	TERIAL:	FROM:	TO:
LOCK NO:				HOLE PLUG:		FROM:	TO:
				FILTER PACK	TYPE:	FROM:	TO:
STATIC WATER	LEVEL:	DATE:	MEASURING POIN ELEVATION:	T DESCRIPTIO	N/		TO GROUND
REMARKS:						SURFACE	(+/-)

INTERVAL(FT) below ground surface	LITHOLOGIC DESCRIPTION USCS NAME (USCS symbol): color, moist, % by weight, plasticity, consistency, structure, cementation, geology	REMARKS



JOB NO:

PROJECT:		WELL NO:
INTERVAL(FT) below ground surface	LITHOLOGIC DESCRIPTION USCS NAME (USCS symbol): color, moist, % by weight, plasticity, consistency, structure, cementation, geology	REMARKS

	·Ei a'		Project:						Personnel:		
	/rie	Project #									
Perspective	. vision. a	olutions	Date/Time:								
	Gr	oundw	ater Sa	amplir	ng and	or Dev	elopm	ent Fie	eld For	m	
Well ID/Sample L	ocation:						Measuri	ng Point	(mp)		(+GS)
Well Type:				Total D	epth:		(bgs		Casing T		
SWL before purg	ing:	(bgs	s / bmp)	SWL po	st purge	:	(bgs	s / bmp)	Well Dia	ameter:	()
Well Locked:	Y / N	Cap/lid:		Y / N	Photos	taken:	Y / N	Monume	ent Type:		
				Purge &	& Samp	ling Equi	pment				
Pump Type:					Pump D	epth:				()	bgs / bmp
Purging Method:					Sampling	g Method:					1ft ³ = 7.48 gal
1 Casing Vol:				3 Casing	g Vol:			Total Vo	ol. Remov	/ed:	
				Inst	rument	Calibrat	tion				
	Model	/Unit #	Buffer	Soln 1	Buffer	r Soln 2	Field Te	mp. (°C)	Instrum	ent Rdg.	Comments
pН	1										
Specific Cond.											
Redox											
ORP											
DO			Salinity %:		Pressure (mmHg):						
			W	ell Evac	uation a	& Monito	oring Da	ta	·		
		Purge									
Time	DTW (bmp)	Rate (L/min)	Purge Vol. (L)	Temp (°C)	pН	SC (µS/cm)	DO (mg/L)	ORP (mV)	Turb (NTU)	(Comments
					Consult						
	Sampling Data Bottle Label Sample Time Sampling Parameter(s) Preservative Method Other										
Bottle Label Sar		Sample	e Time	Sampl	ing Paran	neter(s)	Prese	rvative	IVIet	hod	Other
Samples Analyz	zed by:	Lab Nan	ne:				I		I		

PHOTOGRAPH LOG

Page____ of ____



Project and	Task Numt	per:	Date:
Project Nan			Field Activity:
Location:			
ID#	Time	Direction of View	Subject of Photograph
I			

Ι.	Employee Name:
2.	Employee No.: 3. Office location:
4.	Job title:
5.	Home address:
6. 7	Phone number:
7. 9.	Sex: M F 8. Date of birth: Type of incident: Exposure Physical injury
10.	Address where incident occurred (include county):
. 2. 3.	Date and time of incident:
14	How did the accident or exposure occur? (Describe events fully. Tell what happened and how in happened. Use additional sheets if needed.)
15.	Object or substance that directly injured you:
16.	Describe the injury or illness (e.g., cut, strain, fracture, skin rash):

INCIDENT REPORT Occupational Accident, Injury, or Illness

Part of body affected:												
Did you receive medical care? Yes No If so, when? By whom? (Name and address of physician/paramedic/hospital.)												
If hospitalized, name and address of hospital:												
Did you lose time from work? Yes No If so, how much?												
Have you returned to work? Yes No If so, date returned: List anyone else affected by this incident.												
List any witnesses to this incident.												

Signature

Date



CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Secti Requ	red C		t Inf	orma	ation	:						R	Requ	tion uired	Proj	ject	Infor	mati	on:				Section C Invoice Info													_										Page:	of	
Comp	any:											R	Repo	ort To	1								Attention:																		ŀ	REG	ULA	TO	RY A	AGENC	Y	
Addre	SS:											C	Сору	/ To :									Company N	ame:													🗖 NPDES 🔲 GROUND W							VATE	ATER 🔲 DR NK NG WATER			NATER
												Т											Address: UST RCRA										Ε	ОТІ	HER													
Email	To:											P	Purch	hase	Ord	er No	D.:						Pace Quote	Referen	ce:											1		SI	TE			Γ	GA		ιL	N	П МІГ	NC
Phone	2				Fax	:						P	roje	ect Na	ime:								Pace Projec	t Manage	er:											1	L	OC.	ATI	ON			ОН		SC	- wi	П ОТН	HER
Requ	sted	Due	e Da	ate/1	AT							P	roje	ect Nu	impe	er:							Pace Profile	#:												1	Filt	ered	(Y/I	N)	7	7	7	77	77	77	77	
ITEM #	Se	ctio		S On	Al e Ch (A	NP arac -Z, 0	LE ter p -9 / ,	E [er b -)	D		ation		ATRI R NKING ATER ASTE W RODUCT	G WATER MATER		CO DW WT SL OL WP AR TS					MATRIX CODE	Sample Type G=grab C=comp	COMPOSITE ST			SITE END/	_	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Dupreserved	H ₂ SO4		ierva		Methanol	Other		jues ilysi:					/ ///////////////////////////////////			and Change (Th)	Pace	Project No. Lab LD.
1										Τ		Τ	Τ	Т	Т	Т	Т	Т	Τ	T					İ 🗌		1						Ĩ			Ĭ				Í	Í	Ť	Ť	П				
2							1	╡	╡	╡	╈	T	╈	+	t	t	t	t	╈	T						\square	1			\top	Π	1	T	T	╈	\top				1	╡	╈	\top	\square				
3							╡	┓	╈	╈	Ť	Ť	T	十	t	t	Ť	t	Ť	t						\square	1			┢	Π	T	Ť	Ť	Ť	t	Π			Ť	T	Ť	\top	\square				
4							1	┓	╈	╈	╈	T	╈	+	t	t	t	t	t	T						\square	1			\vdash	П	1	T	T	T	t	Π			1	T	Ť	\top	\square				
5								1	╡	╈	╈	╈	╈	+	t	t	t	t	╈							\square	1			\square	Π	1	T	╈	+	\top				1	╈	╈	\top	\square				
6							1	1	╡	╈	$^{+}$	$^{+}$	╈	+	t	t	$^{+}$	t	$^{+}$	t						\square	1			\vdash	Η	1	╈	$^{+}$	+	$^{+}$	Π			1	1	$^{+}$	+	\square				
7							1	╡	╈	╈	$^{+}$	$^{+}$	╈	+	t	t	+	t	$^{+}$	T					i —	\vdash	1			┢	Η	1	$^{+}$	$^{+}$	╈	$^{+}$	Π			+	╈	$^{+}$	+	\square				
8							╡	╡	╈	╈	+	$^{+}$	╈	+	t	$^{+}$	+	$^{+}$	+	t						\vdash	+			┢	Η	+	$^{+}$	$^{+}$	+	\vdash	Η			╡	╈	$^+$	+	\square				
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Company Name: NewFields Company Name: NewFields FAL Quote #: Contact Name: David Tooke Contact Name: David Tooke Plone: 405:649.8270 FAL: 405:649.8277 Phone: 405:649.8270 FAX: 405:649.8277 Fax: 405:649.8277 Fax: 405:649.8277 Fax: 405:649.8277 Email: dtooke@newfields.com FAL Stote #: Project #: 50:005 Project #: 50:005 REPORT INFORMATION REPORT DISTRIBUTION (email only is preferred) Address: 1/20 Cedar Store #: ADDITIONAL INSTRUCTIONS Report Level: D/II III IV Hardcopy CD (pdf including EDDs if requested) Project #: 50:005 California State Drinking Water Form Source #: Sample: Surget #: Surge	CLIENT INFORMAT	ION		IN	INVOICE INFORMATION (if different from client info)										PROJECT INFORMATION								
Contact Name: David Tooke																							
Address: 1120 Cedar Street, Missoula MT 59802 Phone: 406-549-8277 Project Name: Missoula MT 59802 Phone: 406-549-8277 Fax: 406-549-8277 Email: dooke@newfields.com Project Name: Missoula MIII TAT (busines days):												P.O. #:											
Email: totole@newfields.com TAT (business days): $[\] 15 \] 10 \] 5^{*} \] 3^{*} (Voe)$ REPORT INFORMATION REPORT DISTRIBUTION (email only is preferred) ADDITIONAL INSTRUCTIONS Report Level: $[\] 11 \] 1$		et, Missoula MT 59802					Street, M																
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Samples will be disposed of 90 days after sample receipt unless other arrangements have been made and agreed upon in writing. Delinguished by: Computing and Drinted Name) Data Time	Dolinguished here (Cir		receip		_						-			-	Det		Time	i –					
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Client understands that all terms described in the proposals, quotations, and/or the general terms provided in the current FAL price schedules will be followed. FAL reserves the rights to terminate its service or withhold delivery of reports, if in FAL's sole discretion the terms of the project have been broken.

Field Investigation Form

Project Name:								Date:	
Project Number:							Investigation	Date(s):	
Project Address:							ite Contact: ent Contact:		
Project City:							Q Manager:		
Required Check Offs	Yes	<u>No</u>							
DEQ/EPA Approved SAP SAP Reviewed Utility Locate Number Owner Notified Health & Safety Plan Sample Location Map Holding times work									
Overall Reason For Investigation									

Number of Hours Approved for Sampling Effort (include all that apply)

Task	Hours	Notes
ACM/LBP Inspection		
Soils Investigation		
Groundwater Sampling		
Other		

Sampling Methods

# of Samples	Analytical Para	meters	Media	Natural or QC Sample?	Method #	Containers	Preservative	Hold Time		Sample Locations
Lab Pack]		Standard	Operating Procedu	re	SOP #	
Laboratory]						
Shipping by:]]
Other	r Instructions									

