CHANGE ORDER FOR WELL PROJECT

— Tom

Gary Shaver

January 31, 1998

Cody Mitchell, Field Projects Mgr.
A & E Division
P.O. Box 200103
Helena, MT 59620-0103

CIVIL,

TRANSPORTATION,

ENVIRONMENTAL,

ENGINEERS

Subject: Bluewater Test Well
Change Order No. 2

Dear Cody:

Attached is a justification of costs worksheet for Change Order No. 2 for the above-referenced project. This is being provided in response to Fish, Wildlife and Parks request for a better breakdown of the costs. It is also intended as a worksheet for you and I to sit down and work together on the final "recommended adjusted cost" that we propose to pay the Contractor.

I don't know if you want to provide this copy to F,W&P or wait until you and I go through it all again and come up with the final cost adjustments. I'll leave the decision up to you and Marvin.

Please call me at your earliest convenience so that we can get together and finish this change order.

Sincerely,

ROBERT PECCIA AND ASSOCIATES

Keith A. Jensen, P.E.
Project Manager

KAJ/kaj

cc: Marvin Holtz
Taylor Architects
Braun Engineering

RECEIVED
CONSTRUCTION
DEPT. OF FISH, WILDLIFE & PARKS

COPY

P.O. Box 5653
Custer Avenue
Helena, Montana 59604
(406) 447-5000
FAX (406) 447-5036
www.rpa-hln.com

CHANGE ORDER NO. 2 - JUSTIFICATION OF COSTS

Item No.	Description/Justification of Costs	Contractor Requested Cost	Recommended Adjusted Cost
1	General Well Services - Labor & Rig Time. The Contractor's original estimate of 50-hours to complete this change order was overrun to 94.5 hours, due to two unforseen conditions. The first was the unforseen difficulty (eventual impossibility) of fishing out the retainer which was stuck in the hole. The second was the unforseen cave-ins around the casing which prohibited the Contractor from easily inserting the two tremmie pipes to grout behind the casing. The State DNRC required that the packer be removed, or at least every effort made to do so. They also recommended the use of two tremmie pipes to grout the annulus around the pipe. The Contractor originally asked for $310.00 per hour for his labor and rig time but after further negotiations he reduced it down to $280.65 per hour. The total Labor & Rig Time for this change order, including both unforseen delays, is therefore $26,521.43 (94.5 hours @ $280.65 per hour). In addition the Labor & Rig Time line item for Change Order No. 1 should have been calculated at the same reduced hourly rate of $280.65 per hour. resulting in a savings of $3,991.60 on Change Order No. 1. Accounting for that adjustment now results in the Recommended Adjusted Cost of $22,529.83.	$29,295.00	$22,529.83

2	Montana Oilwell Cementers. The original quote for this work item was $8,150.00. The overrun was caused by two separate items. The first item was an overrun in the estimated amount of cement needed to grout the annulus between the casing and the open borehole. Unfortunately the artesian flow caused scouring and cave-ins in the open hole creating voids which had to be cemented. The actual quantity of cement used was 500 sacks as opposed to the estimated quantity of 305 sacks. This overrun in cement added $5,642.65 to the cost of the grouting. The second overrun item was a standby charge of $8,400.00 (two grout trucks @ $60.00 per hour each for 70 hours) plus 3 days per diem at $145.00 per day for 3 men - another $435.00. The standby charge occured as a result of trying to capitalize on grouting when the stuck retainer had somehow reduced the flow to 10 gpm. At that time there was an excellent chance of grouting the entire well shut and abandoning it permanently. Unfortunately about the time that Montana Oilwell Cementers arrived from Cut Bank the retainer shifted and the full flow returned. Rather than send them back to Cut Bank they were asked to standby and prepare to grout around the casing using the tremmie pipes. It was at this point in time that it was discovered that the tremmie pipes couldn't be installed without specialized drilling equipment to get the tremmie pipes past the blockage. Therefore, Montana Oilwell Cementers was on standbye for 70-hours during which time the tremmie pipes were being drilled and installed.	$22,627.65	$22,627.65
3	Weatherford. The original estimate was $3,000.00 for Weatherford to provide the equipment and a supervisor to fish out the retainer. The overrun was caused by the increased number of attempts to retrieve the retainer, and the eventual inability to do so.	$3,593.20	$3,593.20

4	E.S.P. Pump Rental. The original quote for the rental of this pump was $5,000.00 for 5-days plus any pump damage. The Contractor misunderstood the suppliers quote to include an operator and all peripheral devices to install and operate the pump. This was not the case, the rental of the pump alone was $5,000 for 5-days and the operator and all other devices were extras (see the Contractor's letter dated January 16, 1998). Braun's daily logs show that the pump was not needed after November 28th, yet E.S.P. is charging an additional 3-days of rent at $1,000 per day. It is recommended that this extra rent be denied adjusting the total cost downward to $15,735.65. Pump repair costs?	$18,735.65	$15,735.65
5	Wyoming Casing Service. This subcontractor was hired to physically install the 13 3/8" casing down the hole. There original quote was $1,750.00 which they stuck to with the exception of $136.00 for Bestolite, which the subcontractor thought would be provided by General Well Service but was not.	$1,886.00	$1,886.00
6	Moore Trucking. Moore trucking was the water hauler that was hired by the Contractor to haul the water and drilling fluids off-site and land apply on the neighbors fields. Their actual costs jumped up from their estimate of $2,750.00 to $4,290.00 due to the above-mentioned delays.	$4,290.00	$4,290.00
7	Licensed Water Well Contractor. The licensed water well contractor's original estimate was 5 days of on-site oversight. The actual time spent on site due to the delays of attempting to fish out the retainer and due to the installation of the tremmie pipes amounted to 9 days @ $450.00 per day plus some miscellaneous phone costs.	$4,070.52	$4,070.52
8	Intermountain Well Site Geologists. The geologist hired by the Contractor replaced the geologist that Braun had provided during earlier work. The original estimate for the geologist's services was $2,750.00 but again due to the unexpected delays his actual time included 9 days on site and 2 days of travel to and from Casper, Wyoming.	$6,205.20	$6,205.20

9	J & R Well Service, Inc. J & R Well Service's time was not aniticipated in the Contractor's original estimate. They were called in to drill and install the tremmie pipes which were impossible to install by conventional means due to the hole blockage.	$2,460.00	$2,460.00
10	L. L. Smith Trucking. Trucking charge for delivery of the power swivel used to install the tremmie pipes. Delivery was from Elk Basin, Wyoming.	$773.00	S773.00
11	Leslie Welding. The Contractor's original estimate included $3,000.00 for welding and materials. Line items 11 and 12 deal with the welding and total only $974.80.	$880.00	S880.00
12	Stormonts Welding. See justification above.	$94.80	S94.80
13	K.E.M. Ready Mix. This charge is for the delivery of the gravel which was installed down the annular space on top of the metal petal baskets	$246.00	S246.00
14	Dick Raglan. Local backhoe operator hired to trench outfalls for the artesian flow. In addition this cost covered the reclamation costs associated with the disposal of the waste water on Mr. Raglan's fields.	$500.00	S500.00
15	Northwest Pipe. Miscellaneous parts required during the course of completing this change order.	$576.53	S576.53
16	Purchase of Materials from Contractor. The Contractor sold the materials which were delivered to the site but not installed. These included the 9 5/8" diameter casing, the stainless steel valves, etc... It is anticipated these materials will be reused on another well, therefore it was cheaper to buy them and provide them to the next contractor, rather than pay to restock them.	$34,189.20	S34.189.20
17	Bond Premium. The Contractor is entitled to reimbursement for the extra bond premium associated with this change order.	$2,505.00	S2,505.00
	Subtotal (Labor & Materials) =	$132,927.75	S123,162.58
	Overhead & Profit @ 15% =	$19,939.16	S18,474.39
	TOTAL COST (This Change Order Only) =	$152,866.91	S141.636.97

GENERAL WELL SERVICE, INC.

BOX 1208

CUT BANK, MONTANA 59427

OFFICE PHONE (406) 873-5081
SHOP PHONE (406) 873-4862
FAX (406) 873-5089

January 16, 1998

Keith Jensen
Robert Peccia & Associates
P.O. Box 5653
Helena, Mt 59604

Subject: Bluewater Springs Trout Hatchery Change Order #1 and #2

RE: Response to questions on proposed costs.

Dear Keith,

1. On the drilling rig rate of $310.00 per hour. Normal rig rate is $225.00 per hour. Additional costs for state prevailing wages and per diem is $85.00, putting the rig rate at $310.00 per hour. We charged 15% overhead and profit on $310.00 and we should have only charged 15% on $85.00/hour because profit and overhead is included in the normal rates, but was not included in additional $85.00 billed.

Billed:

1st Change Order	136 hours		
2nd Change Order	94½ hours		
	230½ hours	@ $310 =	$71,455.00
		+ 15% =	10,718.25
			$82,173.25

Should Have Been:

	230½ hours	@ $310 =	$71,455.00
	230½ hours	x $85 =	2,938.88
			$74,393.88

On Change Order #2 Proposed costs were $444,941.63
Credit for Overcharge (above) <-7,779.37>
Partial Payment #1 <-119,223.75>
$317,938.51

2. Bill from E.S.P- When I talked the E.S.P. on the phone about renting pump, they quoted me $5,000.00 for a 5 day minimum. I assumed that was for everything included. I sent three different proposals into the state in two days to combat abnormal water flow. I only had a bid on the phone and had not received a written one yet when I sent proposals in. When I

received the bill I called them up and argued with them over it but they said that it was right. On the three days they'd charged extra it was because the pump was in the hole and they charge for it. Attached is their bid I received after I sent my proposal in.

3. Montana Oilwell Cementers stand by charge. Enclosed see letter from Montana Oilwell Cementers why he charged stand-by.

4. When pumping cement it does not take very long to pump 425 sacks of cement so by the time everyone noticed cement coming to surface, cement was already mixed and being pumped. Enclosed is letter from Montana Oilwell Cementers.

Keith, hope this helps to clarify questions. I had already talked to E.S.P and Montana Oilwell Cementers about their bills before I sent my bill in and they told me that is what they charged. i guess they won't change them. I thoroughly went over all the bills sent to me by sub-contractors before I sent them on to you. I did get Baker Oil Tools to cut their restocking charge and Humes down from $550.00/day to $450.00/day.

If you have any further questions, feel free to call me anytime at (406)873-5081.

Sincerely,

Alan Matz

Alan Matz, Vice-President

MONTANA OIL WELL CEMENTERS, INC.
Est. 1942

OIL FIELD SERVICE CO.

601 East Railroad
P. O. Box 1227
Cut Bank, MT 59427-1227

(406) 873-4211

Representing Baker Oil Tools, Inc. - Baker Service Tools - Baker Packers - Lynes, Inc. - PIP Packers - ECP Packers

January 15, 1998

General Well Service, Inc.
P.O. Box 1308
Cut Bank, Montana 59427

Attention: Mr. Alan Matz

As per our phone conversation you asked me to explain the circumstances on pumping cement for the Montana Fish Hatchery Waterwell 9-2GS-R24E.

We rigged up to the 20" x 13 3/8" annulus of the casing and commenced cementing operations. We mixed 425 Sks. of premium cement. Bill Lloyd, at the very end of the mixing process was over by the pit side of the rig watching for cement returns. When he observed the cement returns to surface, he sent a rig hand over to shut us down. By that time we had completely mixed all 425 Sks. of cement. We had discussed this prior to the starting of the job and agreed this would be the procedure. The hole was washed out excessively, that is the reason it required that much cement to fill back to surface.

This job was completed at 3:00A.M., Nov. 2, 1997.

You have asked me to explain the standby time on the job started on 11-22-97, finished on 11-26-97.

At 8:00P.M. on 11-22-97 Ed Moore, Drilling Superintendent for General Well Service called me and explained that the Baker Inflatable Packer had been driven down the hole by drill collars and temporarily bridged off the high pressure water flow. They had contacted Halliburton who was busy and could not provide service immediately. I told him it was 500 miles but we would load cement and get there just as soon as possible. We arrived on location at 8:00A.M. 11-23-97.

Ed Moore, the BARUN engineer, and myself were standing on the pit side of the rig observing the water flow as very small. My employees were rigging up our equipment to start the cement job. At 8:15 A.M. unfortunately the packer apparently came loose and the full high pressure water flow returned, then you can review your rig reports, a lot of things transpired.

We had a bulk cement unit & high pressure pumping unit with 3 men. Having to pay Davis Bacon Wages which creates considerably higher expenses that we have to pass on. I gave you 8 hrs. to do the job. We completed the job on 11-26-97 at 3:00 P.M. This gave us 70 hrs. waiting time at $ 120.00 per hr. It was unfortunate that the well started flowing again but we, my crew and I spent a week basically on this job including travel time down and back. Therefore, I feel these charges are justified.

You are and have been a valuable customer and I hope this explains everything you have requested.

Sincerely,

Fred Walters

Fred J. Walters, Pres.

FJW/jw

INVOICE

Leo P. McMillan Insurance, I
104 2nd St So, Ste 200
P O Box 2247
Great Falls MT 59403-2247

Telephone: (406) 761-7340
FAX: (406) 761-7342

Invoice #	Customer No	Page
7632	GENW01	1

Bill To:

General Well Service
P.O. Box 1308
Cut Bank MT 59427

CSR: Reed K. Rydell

Invoice Date	Policy Number	Agent	Effective Date	Expiration Date
12/30/1997	FA3029	002	09/11/1997	09/11/1998

Type	Line of Business	Company	Description	Amount
END	084	024	CHANGE IN CONTRACT AMOUNT	2,505.00
			Total Invoice	$ 2,505.00

Customer Original

TOTAL P.06

WELL BID SCHEDULE

BRAUN INTERTEC

Braun Intertec Corporation
2611 Gabel Road
P.O. Box 80190
Billings, Montana 59108-0190
406-652-3930 Fax: 652-3944

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November 14, 1997

Project BHEX-97-004

Mr. Keith Jensen
Robert Peccia & Associates
P. O. Box 5653
Helena, Montana 59604

Dear Keith:

Re: Brief Summary of Construction, Proposed Artesian Well, Bluewater Springs Trout Hatchery, Bridger, Montana

As you requested, we are submitting this letter providing a brief summary of the attempted installation and construction of the proposed artesian well at the Bluewater Springs Hatchery. More detailed information related to the construction has already been submitted in our daily reports.

General Well Services (general contractor) began drilling at the well on the evening of October 26, 1997. The 20-inch diameter conductor pipe to a depth of 40 feet had previously been installed. Initially, the drilling was performed with a 17 1/2-inch bit to a depth of about 95 feet. At this depth, the contractor then decided to pilot a hole with an 8 3/4-inch bit to a depth of 535 feet.

At a depth of about 400 feet, the density of the drilling mud began to decrease, indicating a subsurface water flow was encountered. The contractor therefore began to increase the density of the drilling mud by adding barite. The mud density was increased to 12.6 pounds per gallon (ppg), but the flow was not stopped, and the contractor had run out of barite. Within about one hour, all of the drilling mud was washed out of the borehole. Clear water was running out of the borehole at a rate of about 200 gallons per minute (gpm).

This type of water flow was not expected at these shallow depths. Our hydrogeologic evaluation of the area indicated groundwater could be encountered above 500 feet, but not flowing artesian conditions. We were also aware that several faults were located in the general vicinity, however, the well locations were selected to avoid being situated directly on known faults. These faults may be connecting the Tensleep and/or Madison aquifers to fractures and bedding planes in the overlying bedrock formations. The observed water flow appears to be from these fractures.

At this point in the drilling, a water flow had been identified, but the pressure behind it was unknown. The best method to measure pressure is to install the Blow Out Preventor (BOP) on top of the surface casing, which was trying to be installed by the contractor. Therefore, two approaches were considered. The first approach would be to attempt to gain control of the water flow with drilling mud weighted up to about 16 ppg, which is considered a very high weight. Depending on the pressure, the water flow could once again wash the mud out of the hole. The other option was to ream out the hole to 17 1/2 inches, lower the 13 3/8-inch casing and use about 16 ppg cement to set the surface casing, stop the flow and measure the pressure. The

second option was generally part of the scope of services, while the first option was a change order. Also, the water flow and pressure behind it would not change if the borehole was reamed out to 17 1/2 inches, i.e., size of borehole does not make any difference.

The contractor therefore decided to attempt the second option. This option failed when the cement was washed out of the borehole by the water flow. In the remaining week, two more attempts were made to set the surface casing. These attempts basically consisted of installing a pack-off flange between the 20-inch conductor and 13 3/8-inch casing. On the first attempt, we discovered that the flange basically locked the pressure in, and seepage was observed around the conductor pipe. This seepage could result in an underground blowout and the flange was therefore immediately removed.

For the second attempt, holes were cut in the 13 3/8-inch casing to allow the water flow to come up inside and the contractor attempted to cement on the outside. Unfortunately, the cement followed the water out of the casing. During this process, it was discovered that there were actually two water flows, one at about 280 feet and one at 470 feet, and that they were highly pressurized.

To the best of our knowledge, every reasonable attempt was made by the contractor to install the proposed well. Due to the shallow high pressure water flows, however, we recommended that the well be abandoned.

On November 6, the contractor attempted to install a down-hole retainer at a depth of 385 feet to cut off the lower flow, then install another retainer above the upper flow to cut it off. The lower retainer was installed at a depth of 385 feet and a pressure of 343 pounds per square inch (psi) was recorded. Cement was then placed (pumped through 2-inch casing) on top of the retainer to set it in place, however, the high pressure water flow likely worked its way around the retainer and again washed out the cement. The contractor did not attempt to install the upper level retainer.

The pressure recorded for the lower flow is considered very high for the shallow depth and the pressure of the upper water flow is still unknown. These pressures are considered "abnormal" and are likely in near balance with the existing rock pressures. Meaning that the water pressure can very easily open up new fractures in the surrounding bedrock formations and create new flows (springs). If it is even possible to abandon and plug the flowing well, it is our opinion that highly specialized consultants and equipment will likely be necessary. Another option is to obtain the necessary permits and allow the water to flow. We wish to point out, however, that if the borehole is allowed to flow in its current state, the bedrock around the conductor pipe will likely erode with time and become a pond similar to existing springs in the area. This is also undesirable.

We were also recently made aware of another possible source for the shallow high pressure flows by Mr. Roger Perkins of Aquoneering. The Ruckavina Well #2 is located about 1 mile upstream of the site and is basically an uncontrolled water well. (It was supposed to be an oil well, but was abandoned when artesian flow came up the casing.) The well has been constructed with 8-inch casing, and a hole in the casing has been observed at a depth of about 240 feet. Also, the

flow out of the well has significantly dropped in the past year and lost 50 gpm since the start of the project. Mr. Perkins indicated that the shallow flows encountered by the Bluewater well may be due to the loss of flow in the Ruckavina Well #2.

We will continue to help resolve these problems. If you have any questions, please contact me at your convenience.

Sincerely,

Gregory T. Staffileno, PE
Montana Manager

gts/khr

BRAUN INTERTEC

Braun Intertec Corporation
2611 Gabel Road
P.O. Box 80190
Billings, Montana 59108-0190
406-652-3930 Fax: 652-3944

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RECEIVED
OCT 31 1997
ROBERT PECCIA & ASSOCIATES

Daily Report

Date: October 27, 1997

Project: BHEX-97-004

Client:
Mr. Keith Jensen
Robert Peccia & Associates
P. O. Box 4644
Helena, Montana 59604

Project Description:
Construction Oversight
Artesian Well, Bluewater Springs
Trout Hatchery Improvements
Bridger, Montana

DAY 1 - SET CONDUCTOR PIPE ON WEDNESDAY, OCTOBER 22, 1997.

It is our understanding the drilling for the project actually started on Sunday, October 26, 1997, at about 10:00 p.m. Initially, the contractor attempted to drill with a 17 1/2-inch bit for the first 500 feet. At 95 feet, however, mud circulation was lost and the contractor decided to drill a pilot hole.

DAY 2 **Monday, October 27.** Drilling with an 8 3/4-inch bit occurred to a total depth of 535 feet. In early afternoon on Monday, a slight water flow was observed while drilling. It is our understanding this was observed at a depth of approximately 400 feet and the water flow steadily increased.

To offset the water flow, the contractor attempted to increase his mud weight to 9.5 pounds per gallon (ppg). This did not work and the mud weight was increased to 10.3 ppg. Once again, it did not work, and the weight was increased to 11.1 ppg, which also did not work, but did seem to reduce the flow. Again, the mud weight was increased to 12.6 ppg and a reduction in flow was observed.

At this point, the contractor ran out of barite and had to order more. (Barite is used to increase the weight or density of the mud.) At about 10:00 p.m. on Monday night, it was our understanding the contractor was planning to order more barite to increase his mud weight to 14 to 16 ppg to stop the water flow.

The flow observed at this time was relatively clean water and appeared to be at a rate of about 200 gallons per minute (gpm).

DAY 3 **Tuesday, October 28.** Received call at 5:00 a.m. indicating the contractor was still planning to increase mud weight to try and stop the water flow.

Arrived at site at noon. Met with Ed Moore of General Well Service, who indicated that he had decided not to try to stop the water flow with mud. Instead, he had decided to let the flow continue and slowly ream out the borehole to install the top 500 feet of 13 3/8-inch OD surface casing. His plan was to ream the hole with a 12 1/4-inch bit to the 535-foot depth, then repeat the process with 14 3/4-inch and finally ream the hole with the specified 17 1/2-inch bit.

Several issues were raised at this time related to the 200 gpm water flow out of the proposed well. The first issue is related to the filling of the reserve mud pit. The water flow was being

directed into this mud pit and was slowly filling it. Eventually, it would be over topped and could possibly run into Bluewater Spring Creek. We emphasized that this should not occur.

When the fluid level in the pit reached approximately 3 feet from the top, the contractor had gained access to a nearby property owners field to land apply the water. He therefore used two water trucks to collect the fluid from the pit, then transported it for discharge onto the ground surface.

We did expect to encounter groundwater while drilling the well. We did not, however, expect to encounter high-pressure groundwater, i.e., flowing water. The location of the fish hatchery near numerous fault lines would indicate there is likely some attachment of groundwater through fractures in the underlying bedrock. It is possible this water flow is likely related to fractures in the Chugwater/Piper formations, which are connected to the artesian aquifers in the Ten Sleep formation.

If the top 500 feet of surface casing can be properly installed and cemented, the water flow will likely be cut off. This will also allow the contractor to install his blowout preventer (BOP) in case of an increased water flow.

Bill Lloyd, petroleum engineer, raised another issue at this time regarding the type of cement to use for the top 500 feet of casing. Page 8 of the Technical Specifications indicates that Type G premium cement plus 2 percent calcium chloride should be used. On page 9, we had recommended the use of 10-0 thixotropic cement because the cement would have to set up beneath water. We therefore recommend using the 10-0 thixotropic cement for the top 500 feet as well, because of the flowing water. This recommendation was relayed to Ed Moore.

The third issue is related to the additional barite necessary for this first few days of drilling. Page 11 of the technical specifications indicates the mud weight should be 8.5 to 9.2 ppg. As previously indicated, additional barite was used to help increase the mud weight to offset the flow.

At about 3:00 p.m., met with Ed Moore to discuss these three issues. Indicated to him that these issues appeared to require some reimbursement, which would be determined after completion of the project. In summary, these issues are:

- the operation of two water trucks to transport the water flow,
- using 10-0 thixotropic cement instead of Type G premium cement because of the water flow, and
- the extra barite to help increase the mud weight.

I also indicated there had been some changes to the specifications as well. These changes are the elimination of the proposed concrete slab, which would result in a credit for the project. In

addition, we had previously indicated to Ed that the revegetation of the area upon completion would not be as complex as originally specified and we are expecting a credit for this as well.

I also called the DEQ to discuss discharge of the flowing water from the proposed well. Joe Straska indicated that a new rule permitting the discharge of well water into state water provided it did not contain any pollutants. Drill fluids and drill cuttings would be considered pollutants. He also indicated that a discharge permit was not required for land application of the water, which is the process currently being used by the contractor.

I described the process whereby the flow was being directed into the reserve mud pit and then being pumped into trucks and land applied. I also mentioned the availability of existing grass raceways, which could be used as an emergency storage area. I described that these raceways, if used, would likely settle out many of the larger solids and the final effluent may be pretty clean. He indicated that, if the effluent was clean and only for temporary measures, that the DEQ had allowed some discharge into state water.

This conversation was discussed with Ed Moore and Gary Shaver with FWP. We agreed that the land application was the best method and to continue it as long as necessary. In an extreme emergency, we would consider the use of the raceways and possible discharge into Bluewater Spring Creek.

Wednesday, October 29. Informed Keith Jensen of the previous day's operations and concerns related to water flow. At 9:05 a.m., Ed Moore left a message with our firm indicating they were at 290 feet with the 17 1/2-inch bit. Therefore, they will likely be setting the surface casing and cementing this evening or early tomorrow morning.

At 1:20 p.m., received another phone call from Ed Moore. He indicated that drilling production had slowed down, and that they were at a depth of approximately 400 feet with the 17 1/2-inch bit. I indicated to him that we wanted Bill Lloyd on the site when they set their surface casing and during the cementing process. He indicated he would contact Bill Lloyd to inform him of the schedule.

He also reported to me that the additional cost for thixotropic cement was $7,950 and the cost for the water trucks was $2,100 to date. He had previously quoted $1,200 per day for two water trucks.

Gregory T. Staffileno, PE
Montana Manager

gts:khr

BRAUN INTERTEC

Braun Intertec Corporation
2611 Gabel Road
P.O. Box 80190
Billings, Montana 59108-0190
406-652-3930 Fax: 652-3944

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ROBERT PECCIA & ASSOCIATES

Daily Report

Date: November 4, 1997

Project: BHEX-97-004

Client:
Mr. Keith Jensen
Robert Peccia & Associates
P. O. Box 4644
Helena, Montana 59604

Project Description:
Construction Oversight
Artesian Well, Bluewater Springs
Trout Hatchery Improvements
Bridger, Montana

Wednesday Evening, October 29. Contractor was continuing to ream with the 17 1/2-inch bit to reach the total depth of 535 feet. I had previously indicated the reaming operation would include the 12 1/4-inch, 14 3/4-inch and finally the 17 1/2-inch bits. It is my understanding that the 14 3/4-inch bit was not used.

Reaming of the hole to total depth was completed at about 10:30 p.m. and the casing crew began to set the 13 3/8-inch casing in the hole. To center the casing in the hole, five bow string centralizers were used on the outside. After setting the casing, the next step is to backfill around the casing with cement. Montana oil well cementer mixed up 510 sacks of 10-0 thixotropic cement, as recommended by us. The cement weight was 15.5 pounds per gallon (ppg). The cementing process was started.

Thursday, October 30. The cement was pumped down inside the casing at a weight of 15.5 ppg and was coming out on the exterior side of the casing at a density of 12.5 ppg. Therefore, the subsurface water flow was cutting the density of the cement. Cement pumping was finished, however, the flow still continued between the 20-inch conductor and 13 3/8-inch casing annulus. Unfortunately, the subsurface water flow displaced the majority of the cement pumped down the borehole. Some of the cement, however, did set up below the water flow, below a depth of about 470 feet. Above 470 feet, all the cement was washed out of the hole.

At this point, numerous alternatives were discussed in detail related to construction of the water well. These were related to dealing with the water flow problem. It was eventually decided to fabricate a 13 3/8-inch ID by 19 1/8-inch OD packing element to place between the casing and conductor. Theoretically, the pack-off would stop the flow and allow us to measure the pressure. This value is very important when evaluating alternatives related to stopping the water flow. Late in the evening of October 30, the pack-off was placed around the 13 3/8-inch casing to seal in the water flow. Unfortunately, the water flow broke down the 20-inch casing shoe at a depth of 40 feet, and it began to flow into the cellar around the back side of the conductor pipe. This is referred to as an underground blowout. Basically, the pressure of the water flow exceeded the strength of the soils/bedrock around the 40-foot conductor pipe and cement. We therefore immediately removed the packing element to avoid complete failure of the conductor pipe and a serious underground blowout.

At this point, the water flow was still coming out of the borehole, on the outside of the 13 3/8-inch casing. Although we were unable to control the water flow, we were able to manage it.

The water flow was being directed into the reserve pit and water trucks were being used to land apply the collected water.

0916 **Friday, October 31.** Arrived at site at 9:00 a.m. Water flow was at approximately 200 gallons per minute (gpm) in reserve pit and it was still being trucked to an adjacent property and land applied. Keith Jensen and Marvin Holt (A&E) arrived about 10:00 a.m. to discuss alternatives related to water flow.

At 10:30 a.m., a meeting was held in Department of Fish, Wildlife and Parks building to discuss alternatives and change order costs. Personnel in attendance included:

Greg Staffileno, Braun Intertec
Keith Jensen, Robert Peccia & Associates
Marvin Holt, Montana State A&E
Bill Lloyd, Petroleum Engineer
Durwood Johnson, Geologist
Tom Osborne, Hydrogeologist
Eddie Moore, General Well Service
Gary Shaver, Fish, Wildlife and Parks
Reed Hume, Licensed Water Well Contractor

Several alternatives were discussed at this meeting. The objective of all these alternatives was to come up with a method to shut in the water flow. We pointed out that the water flow was likely abnormal, i.e., connected by fractures to high-pressure artesian flow in the Tensleep/Madison Formations. This water flow is therefore highly pressurized and very difficult, maybe impossible, to shut off. We also offered to help General Well Service with checking the discharge requirements of the water flow to reduce the trucking change order costs.

The alternative suggested by Bill Lloyd at this time was to install a large-flow submersible pump in the 13 3/8-inch casing and to lower the water level to the depth it was entering the borehole. It was therefore necessary for the contractor to subcontract Prairie Wireline Service to run acoustic, temperature, and gamma ray surveys down the casing to evaluate the actual flow depth. The submersible pump was also ordered.

At about 11:15 a.m., a separate meeting was held with Marvin, Keith, Greg and Ed. It was emphasized to Ed that all change orders were to be run through General Well Service and that the installation of the artesian well was his responsibility. Even though Braun Intertec had numerous consultants offering advice, the final decisions related to well installation were the responsibility of General Well Service.

At about 1:45 p.m., Joe Straska with Department of Environmental Quality was contacted regarding the water flow problem on the project. After describing the conductivity (Bluewater Spring at 2,400 mhos and water flow at 4,000 mhos), he approved the direct discharge of the

water flow into the Bluewater Creek. He emphasized the discharge had to be free of pollutants and it was only allowed for 1 to 2 weeks. Ed Moore was informed of this decision.

Later in the afternoon, General Well Service used a backhoe to excavate a shallow trench to the edge of the drilling pad for discharge and the water flow was redirected into it. The water flow from the well was very clean with no pollutants, i.e. no drilling/cementing was occurring. Therefore, hauling of water from the reserve pit was stopped.

Prairie Wireline arrived in the late afternoon and the surveys were conducted. Initially, various surveys were inconclusive about the actual depth of flow. Later on, temperature and gamma ray surveys indicated there were actually two flows; one at about 280 feet and the other at 470 feet. These surveys were stopped at about 470 feet because of an insert float in the casing at this depth.

The two sources and high pressure makes shutting off the flow even more difficult. Numerous alternatives were discussed, including perforating the casing and redirecting the flow inside. Bill Lloyd suggested still using the submersible to lower the groundwater to a depth of about 350 feet. Then pull casing to 275 feet, knock out insert float, gravity cement down the back side of casing and let it set. This would allow the BOP to be installed and the flow shut off. It also has numerous disadvantages, such as (1) how to knock out insert without unscrewing the lowest piece of casing, and (2) how to support the casing with the 7-ton BOP attached to the top. In addition, this alternative would require resizing of the down-hole casing: 13 3/8-inch to 275 feet, 9 5/8-inch to 535 feet, and 7-inch to 1,000 feet.

Later that evening, Tom Osborne and I calculated the reduced flow of the well when completed with 7-inch casing. We estimated 500 to 700 gpm.

Another alternative was also suggested by Fred Walters of Oil Well Cementers and Ed Moore. This alternative basically consisted of perforating the 13 3/8-inch casing to redirect flow into it. Two 6-inch valves would be installed on top of the casing to control the flow. A steel plate (pack-off flange) would then be welded between the 13 3/8-inch casing and 20-inch conductor to prevent flow within this annular space. Then cement would be pumped through this plate to displace the water. Hopefully, the water would flow through the perforated 13 3/8-inch casing and out the top. The 6-inch valves could be used to control the flow and to create some back pressure to hold up the cement on the outside.

The primary concern with this alternative was related to the stability of the soils/bedrock at the base of the conductor pipe. Bill Lloyd's opinion was that the pressure could exceed the bedrock strength in this zone (as it did on 10/29/97) and the flow could erupt outside the casing. This alternative was considered very risky and could result in an uncontrolled artesian flow (spring) in the area and beneath the drilling platform. Ed Moore was informed of these concerns.

We also rechecked the water flow with the use of a weir, provided by Fish, Wildlife and Parks. This is the same weir which had been previously used. Once again, the depth of flow over the weir was measured at 2 7/8-inch. Using flow charts, we calculated a rate of about 200 gpm.

Departed the site at 12:30 a.m.

Day 7 **Saturday, November 1.** Left Billings at 8:00 a.m. to travel to site. A call was placed to Keith Jensen to describe events. Pointed out the alternative with reduced casing sizes resulting in a final flow of about 500 gpm at a velocity of 5 feet per second (fps) and 700 gpm at 7 fps. Keith indicated this flow was well below the desired flow for the fish hatchery improvements and the feasibility was questioned. Keith was informed of the second alternative suggested by the contractor.

Arrived at site at 9:00 a.m. Ed Moore decided to attempt the alternative where the packer is placed around the 13 3/8-inch casing and cement is pumped through it. It would therefore be necessary to perforate the 13 3/8-inch casing to redirect the flow inside to permit the cementing process. Prairie Wireline Service performed the perforating at a depth of 475 feet. The contractor then welded the packer on the annular space between the 13 3/8- and 20-inch casings. He also welded two 6-inch valves on the 13 3/8-inch casing to permit flow. Also, a 4-inch valve was welded into the 20-inch casing to permit a larger flow, if necessary. I asked Ed to call me at home to keep me posted on status. Departed site at 1:30 p.m.

At 10:30 p.m., received call from Ed Moore indicating what they were doing. He indicated they would likely be pumping cement in about 4 hours. Informed him I would come to the site at around 2:30 a.m. the following day to observe construction.

Day 8 **Sunday, November 2.** Tom Osborne and I arrived at the site at 2:30 a.m. to observe the cementing process. Upon arrival, we found out the attempt had already been made and had failed.

Bill Lloyd was on the site during the attempt. Bill Lloyd's report indicated the cement was mixed up and the 4-inch valve hooked to the de-sander pump was closed. The two 6-inch valves were then opened to permit water flow. Almost immediately, water began to flow outside the 20-inch casing in the cellar because the flow was restricted. Bill Lloyd recommended discontinuing the attempt to avoid an underground blowout. Approximately one-third of the way through the attempt, cement began to flow into the rat hole next to the cellar, indicating stability at the bottom of the conductor pipe had worsened. Bill Lloyd again recommended to the contractor to shut down. Even so, the contractor continued his process and pumped all of the cement. Water flow behind the 20-inch conductor pipe was considered very severe. Bill Lloyd recommended hooking up the de-sander pump on the 4-inch and opening both the 6-inch valves to release the subsurface pressure, which General Well Service did. All excess water at this time was directed into the reserve pit, and when necessary, the water trucks collected the water and land applied on a neighbors property.

Departed site at 6:30 a.m. after informing Gary Shaver of events. At 7:30 a.m., called Keith to inform him of events. At this point, we have made three attempts to construct the well. Unfortunately, all three have failed and now the stability of the conductor pipe shoe is marginal.

Recommended to Keith that we abandon the well and attempt to plug the hole. Keith agreed and emphasized the need to get a better handle on all costs to date on the project.

At 3:30 p.m., Ed Moore called to ask about status. Informed him it was our opinion that there did not appear to be any way to complete the well due to the high pressure flow and unstable conductor pipe shoe. He agreed and began to discuss alternatives for abandoning. He indicated the first step was to attempt to pull out the casing, but it was cemented at the bottom, i.e., below 470 feet. If it could not be pulled, it would have to be cut off as close to the cemented zone as possible. Prairie Wireline Services has the cutting tool. He also described the packers used to cut off the flow and that they would take several days to get to the site. Said he was considering sending crew home after removing the casing. I informed Ed that whatever he could do to reduce costs associated with the work would be appreciated.

Gregory T. Staffileno, PE
Montana Manager

gts:khr

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ROBERT PECCIA & ASSOCIATES

Daily Report

Date: November 6, 1997

Project: BHEX-97-004

Client:
Mr. Keith Jensen
Robert Peccia & Associates
P. O. Box 4644
Helena, Montana 59604

Project Description:
Construction Oversight
Artesian Well, Bluewater Springs
Trout Hatchery Improvements
Bridger, Montana

Arrived at site at 8:00 a.m. to observe the installation of the downhole retainer to abandon the well. Met Pat Sapp with Baker Tools, who was the certified technician involved in selecting the location (depth) and installing the retainer. He indicated the retainer had a diameter of 10 inches and was one of the biggest retainers ever installed. Also, he recommended the retainer be set at a depth from 385 feet to 390.5 feet. The element inside the retained is then expanded with the use of pressurized water, and it expands to the sidewalls of the borehole to cut off water flow from beneath it. During installation, however, water beneath the retained is directed through it and up the drill pipe.

The retainer was set at a depth of 385 feet. A pressure of 343 psi (corrected) was recorded at this depth. Bottom hole pressure from the lower zone pushed the retainer up the open borehole 18 feet to a depth of 367 feet. Driller was able to close the valves in the packer with a 10,000-pound pull, and the flow up the drill pipe was stopped. Unfortunately, the retainer again moved up the hole just a few inches, which reopened the valves in it. Therefore, water from the lower zone again began to come out the drill pipe.

The two flows were now separated; the lower flow was coming out of the drill pipe while the upper flow was coming out the top of the conductor pipe. We were therefore able to measure the flow rates with a wier; lower zone flow was 91 gpm and upper zone flow was 84 gpm. A sample of the water from the lower zone was also obtained for testing. Analytical tests will likely be conducted on this sample and reported upon completion.

At this point, it appeared the weight of the drill pipe was holding the retainer in place, and it was decided to place cement on top of the retainer from about 367 feet to 280 feet to hold it in place. Contractor then departed site to go to Northwest Pipe in Billings to obtain 2-inch pipe to place them cement.

Also Roger Perkins with Aquoneering stopped by the site. Mr. Perkins has been measuring the water flows out of the Ruckavina Well #2 on the Raglon Ranch about 1 mile away. He indicated the well has lost about 50 gpm since drilling for the Fish Hatchery well started. The high pressure flows and drilling conditions were described to Roger. He indicated these conditions were likely related to the loss of flow from Ruckavina Well #2.

Around 4:00 p.m., the retainer was pulled and the valves shut to prevent the lower zone water from flowing through the drill pipe. The placement of cement on top of the retainer was then

started. It was mixed by the contractor with 3 percent calcium chloride to help set the cement faster. The cement was pumped down on top of the retainer for about one-half hour.

At this point, the upper flow was relatively clear, but then began to gray as it mixed with a little of the pumped cement. This was not considered unusual, because some intermixing was anticipated. After about 45 minutes, however, we noticed the upper flow had turned a very dark gray and was basically cement.

The fact that the cement was flowing back out of the borehole indicated the retainer did not work. It appears the lower flow likely cut channels in the bedrock around the retainer, washing the cement out the top of the borehole. Because the water level in the reserve pit was relatively high, it was decided to utilize the earth raceways of FWP. Assisted Gary Shaver in obtaining the gates for these raceways to help provide some detention of the water from the well.

At around 6:00 p.m., informed Keith Jensen that the retainer did not work. Keith reminded me that there was a meeting tomorrow in Helena at 1:00 p.m. to summarize events related to the construction and installation of the water well. Departed site at about 8:00 p.m.

Gregory T. Staffileno, PE
Montana Manager

gts:khr

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Daily Report

Date: December 2, 1997

Project: BHEX-97-004

Client:
Mr. Keith Jensen
Robert Peccia & Associates
P. O. Box 4644
Helena, Montana 59604

Project Description:
Construction Oversight
Artesian Well, Bluewater Springs
Trout Hatchery Improvements
Bridger, Montana

Continue #2 Page 1 Work

Friday, November 21, 1997. General Well Service attempted to pull the retainer from the borehole on this date. These attempts are referred to as "fishing," and a specialist with a fishing tool were used to attempt to catch the retainer and pull it out of the borehole. Initially, it was thought the retainer was at a depth of about 90 feet. During the retrieval work, it appeared there was slough at this depth and the retainer was actually deeper.

Eddie Moore with General Well Service indicated they finally encountered (tagged) the retainer at a depth of about 260 feet. The fishing tool did grab ahold of the retainer and Mr. Moore indicated they pulled on it with a force of 40,000 pounds. The fishing tool then slid off the retainer. He also indicated that this was the maximum amount of force that would be applied to pull the retainer out of the hole to avoid damaging the drill rig and for safety concerns.

Mr. Moore indicated that they were intending to work day shifts, i.e., from about 7:30 a.m. to 5:30 p.m. He indicated they would continue to try to retrieve the retainer on Saturday.

Saturday, November 22, 1997. Contractor continued to attempt to retrieve of the retainer with the fishing tool. It was decided to meet in Laurel for lunch to discuss the project. Met Mr. Moore and Mr. Reed Hume, licensed water well contractor, in Laurel at about 12:30 p.m. I provided Mr. Hume with copies of the geologic log and waterline logs (caliper log, gamma ray cement bond log and temperature log).

Mr. Moore indicated they had broke the fishing tool. They then put on the 17 1/2-inch drill bit and tried to ream the retainer. At a depth of 270 feet, it quit going down. They pulled the drill bit, and all three tricone tips were cut, indicating they were on top of the retainer. He also indicated that during this process, it appeared the flow out of the borehole had reduced. Departed Laurel at 2:00 p.m.

At 3:20 p.m., received call from Mr. Moore indicating that the flow out of the borehole was only 10 gallons per minute (gpm). This is a significant reduction in the flow, which had previously been 200 gpm. He indicated that, it appeared the retainer had been forced back into the borehole cutting off the majority of the flow. With this low volume of flow, he indicated that they could likely plug the hole by placing concrete on top of it.

At 5:30 p.m., Mr. Moore contacted me at home and indicated that Haliburton (cement subcontractor) was busy until at least Monday. He indicated that Montana Oil Well Cementers could be at the site at 8:00 a.m. tomorrow to place cement above the retainer.

Without knowing how long the retainer would stay in place and the flow be reduced, it was decided to use Montana Oil Well Cementers because they could get to the site sooner than Haliburton. He indicated that Montana Oil Well Cementers would bring as much cement as possible.

Sunday, November 23, 1997. At 6:00 a.m., received call from Mr. Moore indicating that Montana Oil Well Cementers was in Park City. At 7:15 a.m., I met Mr. Moore and Mr. Fred Wallers with Montana Oil Well Cementers in Bridger. We discussed the approach to cementing above the retainer to cut off the flow. With the flow reduced to only 10 gpm, both individuals indicated they could likely shut off the flow.

Arrived at site at 7:40 a.m. and observed the 10-gallon per minute flow from the drill hole. The drill crew was in the process of pulling the drill stem pipe, which had been set on top of the retainer overnight. At 7:49 a.m., the original flow returned to the surface and the volume appeared to be about 200 gpm. It appeared that the flow beneath the retainer had worked its way around it allowing it to return to its original volume.

At this point, it was decided to go back to the original plan for this phase of the project. This plan consisted of inserting a submersible pump and lowering the groundwater level in the borehole. We would then install the 13 3/8-inch casing and cement up the back side of it with tremmie pipes. Metal petal baskets would be installed on the bottom of the casing to help prevent the cement from going below it and up inside.

I informed Mr. Moore that I had been contacted by Mr. Roger Nobel of the DNRC. Mr. Nobel had suggested using two tremmies to cement up the back side, because it would likely do a better job than one tremmie. It was therefore necessary for us to order some additional 2-inch casing from Northwest Pipe to provide enough pipe for both tremmies. Informed Mr. Gary Shaver of FWP of the status of the project. Departed site at 11:15 a.m.

Returned to site at 7:10 p.m. Met Mr. Kevin Goldrick, consulting geologist working for General Well Service. I also met Mr. Norman Leonard of ESP Pumps. At this point, the casing crew was getting set to lower the 13 3/8-inch casing into the borehole. This proceeded until about 9:00 p.m. The casing was lowered into the hole to a depth of about 240 feet. Two metal petal baskets were placed from 232 to 234 feet and 236 to 238 feet. The contractor then placed some pea gravel on top of thee baskets.

The next step was to lower the submersible pump and set the tremmie pipes on the outside. Mr. Goldrick indicated this would likely be accomplished tonight, and then they would cement up the back side. I therefore decided to stay and observe this process throughout the night.

Gregory T. Staffileno, PE
Montana Manager

gts:khr

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ROBERT PECCIA & ASSOCIATES

Daily Report

Date: December 2, 1997

Project: BHEX-97-004

Client:
Mr. Keith Jensen
Robert Peccia & Associates
P. O. Box 4644
Helena, Montana 59604

Project Description:
Construction Oversight
Artesian Well, Bluewater Springs
Trout Hatchery Improvements
Bridger, Montana

Sunday, November 24, 1997. As previously indicated, the contractor was setting the 13 3/8-inch casing and was going to run the tremmie pipes down on the outside. They were also going to lower the submersible pump down inside the 13 3/8-inch casing, then begin to pump to reduce the flow and pressure on the system for cementing. The contractor would also to lower two tremmies down the outside and cement up the back side to the surface.

At 12:20 a.m., the 13 3/8-inch casing was almost set. They were in the process of welding it to the 20-inch conducter pipe to support it during construction. The contractor then began to lower one of the tremmies down the back side of the 13 3/8-inch casing. At 4:20 a.m., one of the tremmie pipes had been lowered to a depth of 100 feet and had run into slough, which had fallen between the borehole and 13 3/8-inch casing. In order to advance the casing, the contractor began to pump water down it (referred to as circulating). It did not work, and the contractor decided to try to use 1 inch casing versus 2-inch. It was thought that the smaller casing size could perhaps go through the slough easier with the circulation.

At 8:00 a.m., the contractor decided to lower the pump to determine whether or not it could reduce the flow. Initially, it was pumping at 75 gallons per minute (gpm) at the surface and the flow was still coming out of the borehole. It was thought that a connection between the pump and the drill stem pipe was causing a reduced flow. This connection was only 1-inch diameter, which would affect the capability of the pump. It was decided to get a bigger connection.

At 2:00 p.m., the contractor had obtained a bigger connection with about a 2 1/2-inch ID. By 3:00 p.m., the pump was lowered and the flow measured out of the submersible pump only 90 gpm. Water was still coming up out of the borehole. At this point, Mr. Leonard with ESP Pumps checked the hookups to the submersible pump. He decided to switch the leads, which increased the flow from the submersible pump to over 300 gpm. The water level in the casing immediately dropped.

Between 3:00 p.m. and 6:30 p.m., the pump was working at a 60 percent capacity, and the measured outflow was about 300 gpm. The contractor was still attempting to install the tremmie pipes with the use of circulation.

By 7:00 p.m., the contractor was still attempting to advance the 1 inch tremmie through the slough. At this point the contractor shut down the project because the drill crew had worked for almost 48 hours and were very tired. He indicated they would try again tomorrow morning.

I previously contacted Bill Neff with our firm to go to our office and bring out a water level indicator. With this tool, we could measure the water level down inside the 13 3/8-inch casing. Mr. Neff arrived at the site at about 7:00 p.m. with the water level indicator. Departed site at 7:30 p.m.

Monday, November 25, 1997. Arrived at site at 8:15 a.m. The contractor was still trying to advance the tremmie pipe through the slough. He attempted until about 2:00 p.m. and had switched to 2-inch casing. They were able to get one tremmie pipe to a depth of 160 feet, however, progress was very slow. It was decided to attempt another method.

The contractor suggested they obtain a power swivel system to advance the tremmie pipe through the slough. A power swivel system is a hydraulic drill motor which turns the casing as it is advanced. They contacted J&R Well Service from Powell, Wyoming. Departed site at 4:00 p.m.

Received call from about 10:00 p.m. from Mr. Eddie Moore. He indicated that the power swivel system had arrived on site and they used it to install 2 3/8-inch tubing down the right side.

Tuesday, November 26, 1997. Arrived at site at 8:15 a.m. Mr. Goldrick updated me on the events through the night. He indicated the power swivel system was used to drill a 2-inch diameter hole to a depth of 220 feet on the right side. They then ran back down this hole with the 2 3/8-inch tubing. They set the 2 3/8-inch tubing at a depth of 212 feet. They ran down the left side with 2-inch casing. The 2-inch casing was advanced to a depth of 180 feet.

At this point, the submersible pump was set such that the flow out of it was about 325 gpm. The water level measured down inside the 13 3/8-inch casing was at a depth of 80 feet and falling. On the back side, the water level was measured at a depth of 18 feet.

Using the water level indicator, measurements were taken to evaluate the depth of water inside the casing. The submersible pump had been lowered to a depth of approximately 150 feet, and the contractor had to avoid lowering the water level inside the casing below this depth. They were attempting to establish a static water level inside the casing. Through these measurements, they decided to slow down the submersible pump. The pump was slowed down to about 300 gpm, which created a static water level inside the 13 3/8-inch casing at a depth of 120 feet. The water level on the back side was 28 feet, which was also relatively static.

At 2:00 p.m., a staging and safety meeting was held at the site. At 2:15 p.m., the cementing process was started. The contractor pumped approximately 520 sacks of cement down the two tremmie pipes, which had been manifolded together. During the cementing process, I recorded the weights of cement used. Four samples were taken during the cementing process, and the cement weights ranged from 15.1 to 15.9 pounds per gallon.

At 2:45 p.m., the return of the cement to the surface of the borehole was observed. At this point, the returns were relatively thin, meaning they had been diluted by water. The cement was coming inside and outside the 13 3/8-inch casing. At 2:50 p.m., full cement returns were

observed. The water level inside the 13 3/8-inch casing was checked again, and it was observed at a depth of about 125 feet.

It was decided to let the submersible pump run overnight to allow the cement to properly set around the casing. Mr. Leonard would return to the site Thursday morning and turn off the pump. Once the pump was turned off, the water would be allowed to flow up inside the 13 3/8-inch casing and would be redirected to the reserve pit or Bluewater Spring Creek.

At about 7:00 p.m., Gary Shaver returned to the site. Informed Gary Shaver of the status of the project and loaded up some of my equipment. Departed site at 8:00 p.m.

Kim Raymond

Gregory T. Staffileno, PE
Montana Manager

gts:khr

MONTHLY LOGS

MONTANA DEPARTMENT OF
FISH, WILDLIFE AND PARKS

Monthly Activity Report

MONTH	:	OCTOBER 1997		
HATCHERY	:	Blue Water Springs		
PERSONNEL	:	SHAVER	: BRAUND	: ELLIS
FISH & WATER SUPPLY PROTECTION DUTY				
HOURS PERFORMED	:	112	: 192	: 192
VISITORS	:	16		

Caring for Grayling, forage fish and Bass Brood stocks, daily. Continue winterization of grounds and equipment.

Contract for drilling Artisan well, the first actual work phase of hatchery renovation was awarded.

10/10: Contractor crews arrived began preparing 200 foot square work pad for oil well sized drilling rig.

10/15: Drilled 4 ft. diameter hole and installed forty foot long, 22 inch diameter conductor pipe and incased it in concrete. For the next ten days various components of the drilling rig arrived on site.

10/26: Sunday, all of drilling rig was erected and 24 hour/day drilling operation started.

10/27: 8 inch diameter hole drilled 535 ft. deep. Had hit two sources of unexpected artisan water flow at 240 ft and 476 ft deep. Approximately 175 gpm.

10/28: Several attempts to control water flow failed. Decision was made to ream out hole to 17 inch diameter and install 13 inch well casing to bottom of hole. Hatchery crew began monitoring flows from Bluewater Spring to evaluated if artisan well flow was from spring source.

10/29- 10/30: Well hole reamed out and well casing installed. Two more attempts to seal off artisan flow failed.
Basically at this point the well is a uncontrolled under ground blow out.

10/31: All parties concerned met at hatchery, Architects, State A&E, sub contractors, and engineers. Decision was made to make one more attempt to salvage the well.

C: R-5; Ellis

MONTANA DEPARTMENT OF
FISH, WILDLIFE AND PARKS

Monthly Activity Report

MONTH	:	NOVEMBER 1997		
HATCHERY	:	Blue Water Springs		
PERSONNEL	:	SHAVER	: BRAUND	: ELLIS
FISH & WATER SUPPLY PROTECTION DUTY				
HOURS PERFORMED	:	224	: 144	: 112
VISITORS	:	100 plus		

11/1: - 11/2: With several engineers on site, working 24 hrs a day, attempt to concrete in 535 foot of well casing failed. Decision to abandon well was made at 5:00 AM. the 2 nd.

11/3: 500 ft of well casing was pulled out of hole and several technical procedures conducted to evaluated procedures required to seal off well.

11/4 - 11/5: Work on well continues. Shaver attended meeting at Lewistown with other hatchery managers to review $ 1.6 million water enclosure project at Lewistown hatchery.

11/6: Materials and equipment have arrived on site to cement and seal off well. A 6 ft long rubber and metal, hydraulically expandable plug (packer) was inserted into well hole at 350 ft . Packer was expanded to seal off lower water flow. When valve was closed to measure water pressure, 343 psi., packer and 24,000 lbs of drill stem pipe was instantly shoved 18 ft back up hole. 10,000 lbs of concrete was pumped down on top of packer to seal off water flow. Concrete held of one hour and was then blown back out of hole.

Well is still a uncontrollable blow out.

11/7: Shaver attended meeting in Helena with all concerned parties to review well drilling attempt. Drill rig supervisor was allowed to partially dismantle drill rig for safety purposes and lay off drilling crew.

Approximate well cost to date is over $300,000.

Remarks, nobody has ever hit this kind of pressure this shallow.

Illustration of this kind of water pressure for those people that have operated a fire engine water pump, Wisconsin 4 cylinder at 100 psi with 2 inch lines, from 1/2 inch nozzle, which will shoot 60 gpm water 100 feet. The water pressure from well is three times the fire pump and from who knows what size of small hole or crack.

cont:
BLUEWATER HATCHERY , November 1997 Summary Continued:

Several agencies, DEPT. DEQ, DNRC, Water Well Board of Commissioners, are now involved with regulation of well, which is now a free flowing spring in the middle of hatchery grounds.

Water Well Board will not approve moving drill rig off of well site until water flows are controlled. Well contractor has lost future drilling contracts due to over run of this project.

11/21: Thursday
New and old: Equipment, Materials, Engineers and Drillers back on site to install and cement in well casing as deep as possible. 24 hr/day operations began.
Packer is cemented in solidly at 262 ft depth. Hole was drilled out and casing installed. Submersible pump was used pumped well for 3 days to lower water level.

11/26: Completed pumping cement into well on out side of casing to 230 ft depth. Cement will be allowed to set for several days before capping and installing valve on well head.
Trivia Notes:
Present cost for abandoned well is approximately $445,000 .

Diameter of well hole, Sq.inch X psi = 80,000 to 100,000 lbs of hydraulic lift in well hole, DEPENDING ON ACTUAL PRESSURES.

Water chemistry of well water and comparison:

	? NEW ? WELL	BLUE WATER SPRING	LEWISTOWN BIG SPRING	
Calcium	425	592	56	MG/L
Sodium	585	21.5	8.8	MG/L
Sulfate(so4)	2520	1403	29	MG/L
Hardness	3910	1450	224	
Conductivity (umhos/cm)	4023	2404	395	

Any one want to salt some parasites, blue a rifle barrel or lob a rock at the moon. ??

Hatchery activities:
Received 250,000 Aoo1 fish eggs the 13 th, hatched out by the 23 rd. Transported 230 lbs of forage for bass from Big Timber Hatchery the 18th and fed up same. Moved Grayling to out side raceways. Performed maintenance and repairs to distribution vehicles. All personnel taking vacation as scheduled.

C: R-5; Ellis

MONTANA DEPARTMENT OF
FISH, WILDLIFE AND PARKS

Monthly Activity Report

MONTH	:	DECEMBER 1997		
HATCHERY	:	Blue Water Springs		
PERSONNEL	:	SHAVER	: BRAUND	: ELLIS
FISH & WATER SUPPLY PROTECTION DUTY HOURS PERFORMED	:	160	: 224	: 112
VISITORS	:	100 plus		

A001 for Cooney and legal plants split and inventoried. Received 83,000 I001 eggs for 1998 fall, legal size plants. Fed forage fish to bass brood stock every two weeks.

Turned in small spring, constructed modified magic fingers type aeration structure and replaced platform structure in spring inflow box. Had new tires put on GMC pick up and built boxes filled with sand for weight for back of pick up.

Well contractor was given permission leave hatchery. Drilling rig was dismantled and removed.

Two six inch valves were installed on well head. Engineers recommend that valves never be closed. In ground water pressures and hydraulic lift are to high for present set up to contain. Possible to blow well casing out of ground or start a new spring at another location.

Hatchery personnel installed temporary plastic piping on well head to divert 212 gpm to raceway over flow ditch. This water could eventually be used in hatchery production if diluted with total hatchery flows. Temporary fencing was erected to deter public presence at well head site.

Representatives from the DNRC and Montana Water Well Board of Commissioners visited station to view well site.

One person attended regional meeting. Personnel used vacation and comptime as work schedule allowed.

c: R-5, Ellis

MONTANA DEPARTMENT OF
FISH, WILDLIFE AND PARKS

Monthly Activity Report

MONTH	:	January 1998		
HATCHERY	:	Blue Water Springs		
PERSONNEL	:	SHAVER	: BRAUND	: ELLIS
FISH & WATER SUPPLY PROTECTION DUTY HOURS PERFORMED	:	208	: 112	: 176
VISITORS	:	31 plus		

Spray cleaned 4 raceways, inventoried and moved first lots of A001 to out side. Received 70 quarts, 650,000 - I001 eggs, which filled up the hatchery building. Grayling are 6 inch plus and doing well. Fed forage to Bass Brood stock every two weeks. Spent 3 days removing moss and mud from large raceways containing Bass Brood stock.

Water pump for residences blew out and was replaced, residences #1 & #2 were with out water for 24 hours and res. #2 with out hot water over the weekend.

Processed fish food order for Feb. and March. Processed paper work for capitol maintenance of new well for FY- 00/01. Thurston Dotson visited hatchery to give Shaver his 1997 Performance Appraisal.

Shaver attended meeting in Helena with A & E, and all Hatchery Renovation personnel to review water well drilling attempt. Architects were given directive to evaluate if it is even possible to construct a well on site and to evaluate the feasibility to continue the hatchery renovation based on remaining funding level. This evaluation to be completed by March of 1998. Providing a clean, protected and stable water source is the driving force, number one priority of the renovation plans.

Shaver attended Joint Fisheries/Hatchery managers meeting the second day of the meeting in Helena.

c: R-5 : Ellis

OTHER WELL INFO

Montana Fish, Wildlife & Parks

MEMORANDUM (ZIP)

June 22, 1998

TO: Marvin Holtz

FROM: Tom Hansen

RE: Bluewater Hatchery Well

We are in the process of presenting three options to Pat Graham (FWP Director) on how to proceed with the Bluewater Hatchery project.

One of the options would be drilling a new well. However, we do not want to proceed with any option at this time!

Greg Staffileno (Braun Intertec) said a contract to proceed with an RFQ package was sent to him. I told him to **stop**! Do not proceed any further. Can we get a copy of Greg's fee proposal?

At this time, please proceed no further on this project until we establish what direction we want to go.

c. Larry Peterman
Gary Bertellotti
Gary Shaver
Russ Katherman
Paul Valle
Greg Staffileno (Braun Intertec)