

Padilla, Cherie

From: Terry Scanlan [TScanlan@spfwater.com]
Sent: Thursday, April 29, 2010 4:11 PM
To: Padilla, Cherie
Cc: Carol MacGregor
Subject: Carol MacGregor 65-
Attachments: Scanlan 3-3-08.pdf; Carter 7-9-08.pdf

Hi Cherie

Carol MacGregor asked that I forward copies of these letters to you. Please contact me with any questions.

Terry M. Scanlan, P.E., P.G.
SPF Water Engineering, LLC
300 East Mallard Drive, Suite 350
Boise, ID 83706
208-383-4140 office
208-383-4156 fax

4/29/10

The documents contained within this email
were never received by the dept. until today
or at least that I can tell.

cp

**SPF**

Water Engineering, LLC
water resource consultants

March 3, 2008

Steve Lester
Water Right Supervisor
Idaho Department of Water Resources
2735 Airport Way
Boise, ID 83705

COPY

Subject: Diversion Works for Permit 65-13912
Carol MacGregor – Belvidere Hot Springs

Dear Steve:

Condition No. 7 of permit 65-13912 states the following.

Prior to construction of diversion works for the surface low-temperature geothermal water from Belvidere Hot Springs, the right holder must submit plans and specifications for the spring diversion to the Department, and the Department must approve the plans and specifications. The plans and specifications must provide for direct water delivery to water rights no. 65-12891 and no. 65-13332, at no cost to the holder of those rights, to replace reductions in the quantity or temperature of water historically diverted under water rights nos. 65-12891 and 65-13332 caused by diversions under permit no. 65-13912.

Works for diversion of water from Belvidere Hot Springs were installed in October 2006 to resume beneficial use of decreed water rights 65-1972 and 65-1973. This work was initiated prior to approval of permit 65-13912 because resumption of use for 65-1972 and 65-1973 was required by November 1, 2006 based on Applications for Extension of Time to Avoid Forfeiture that were approved March 21, 2002. Use of water was resumed on October 25, 2006. The two water rights authorize diversion of 0.05 cfs (22.5 gpm) for domestic purposes.

The diversion works for 65-1972 and 65-1973 consist of a gallery of perforated pipes that were placed in the lower hot pool at the spring, a suction pump, and piping to a home. Prior to installation of the pipes, the hot pool was cleaned of debris using a backhoe. The gallery pipes were then installed approximately 3 feet below grade in a 6-foot by 5-foot rectangle. Above the gallery pipes is a bed of 1.5-inch drain rock that is covered by geotextile membrane. The membrane is covered with washed ballast rock. The gallery pipes are 4-inch CPVC with horizontal slots. A non-perforated 4-inch pipe extends approximately 30 feet from the gallery to the pump. A 2-inch insulated CPVC pipe extends approximately 900 feet southwest from the pump to a home with a soaking pool. A 4-inch ABS pipe returns the water to Moores Creek. An as-built schematic of

the diversion works and photographs of construction provided by the contractor, Gilbert Pond, are attached.

The pump utilized for diversion of water rights 65-1972 and 65-1973 is a 1.5-hp Sta-Rite JPHF rated to produce approximately 22 gpm at 90 feet TDH. Diversion of a portion of 65-13912 can occur using the same system because the JPHF pump can produce 50 gpm at 65 feet TDH. No additional construction is proposed for 65-13912 at the current time. Addition diversion capacity may be installed after testing of diversions with the existing pump system.

The discharge from the pump has a threaded attachment point that could be used to connect additional pipe. In the event that water rights 65-12891 and 65-13332 are adversely diminished by diversions under 65-13912, piping could be connected at this location and extended less than 200 feet to supply the source of 65-12891 and 65-13332. In an emergency, such a connection could be implemented in a few hours if needed.

Flow rate through the system can be measured using a bucket and stop watch at the return point to the creek. If needed, the pump can be locked out at the disconnect switch.

Please contact me with any questions.

Sincerely,

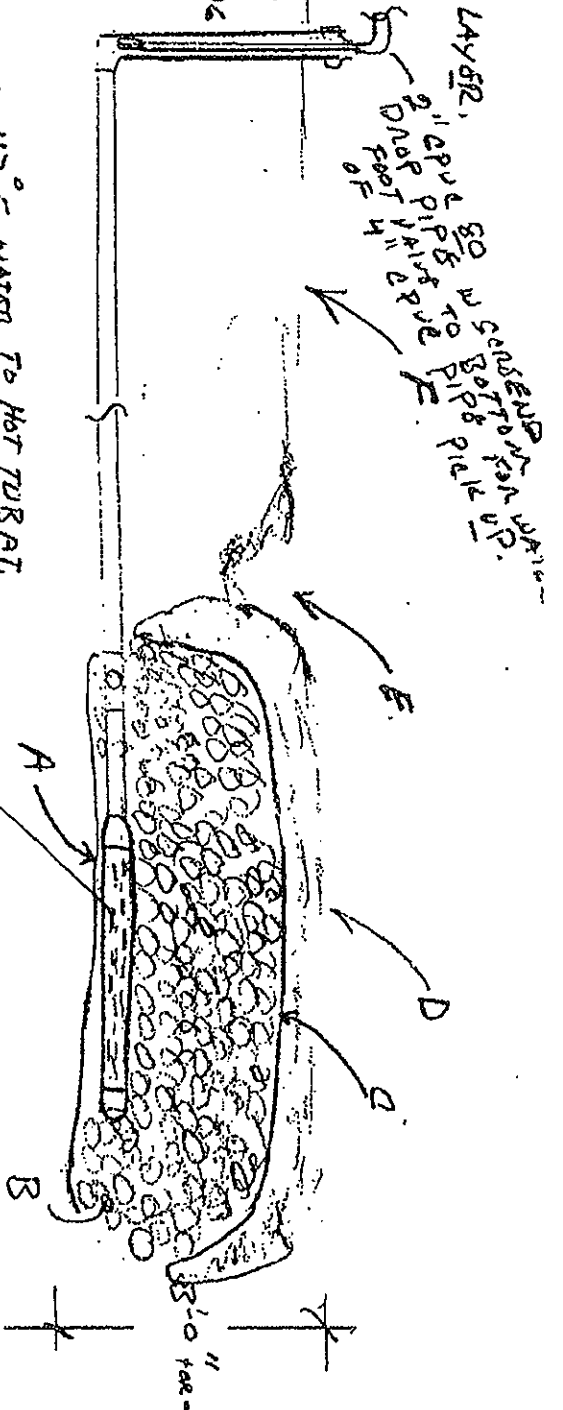


Terry M. Scanlan, P.E., P.G.

Cc: Carol Lynn MacGregor

File: 199.0010

- A. HAND DRAIN STONY-POULDS LAYER.
- B. 1/2" CLEANED BRASS.
- C. MET BRASS -
- D. EXISTING SOIL & GRASS
- E. RUN OFF HOT WATER FROM AROUND AREA.
- F. MUDY, SPAIN & BURGUND FOR ABOUT 60' AROUND AREA.



TEST PUMPING. IS DELIVERING 117' F WATER TO HOT TUBS AT ABOUT YARD OF HOUSE 900' + AWAY FROM SPANDE.

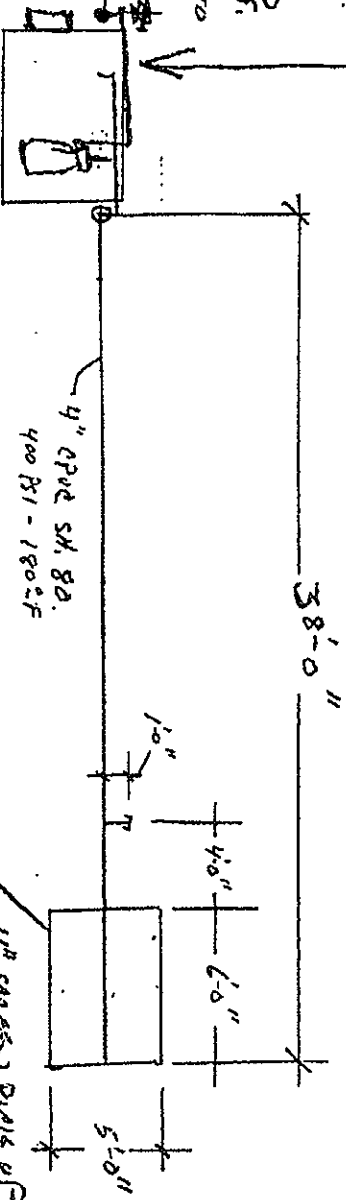
2\"/>

6x5 CPVC PILE UP SCHEDULE. MADE FROM 4\"/>

900' + TO HOUSE. CROSSING ANGLE AT BELIEF ABOUT.

450' FURNACE PUMP. INSULATED WITH 1/2\"/>

PUMP PLATFORM & COVER.

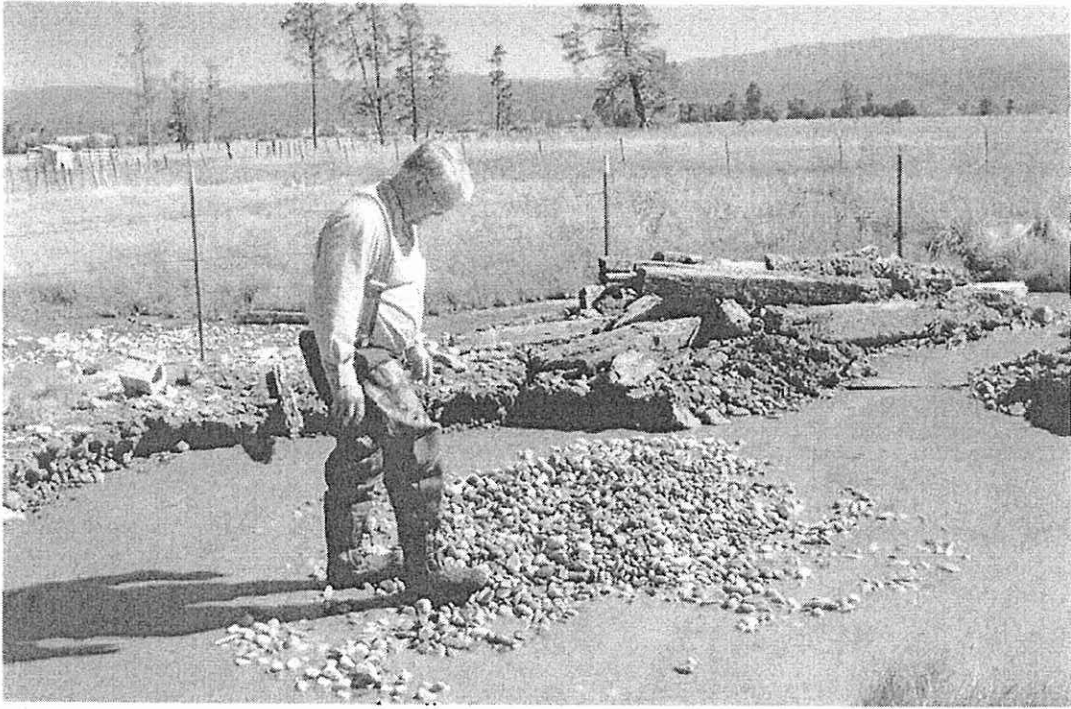


4\"/>

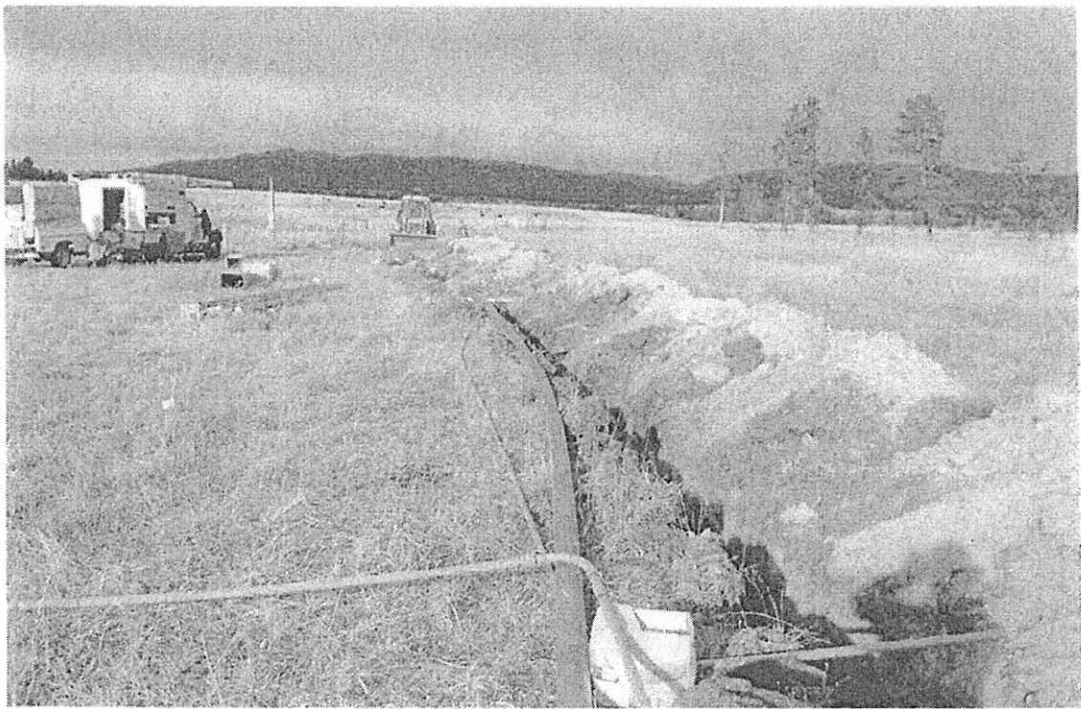
DRAWING BY: AUGUST K. POND.

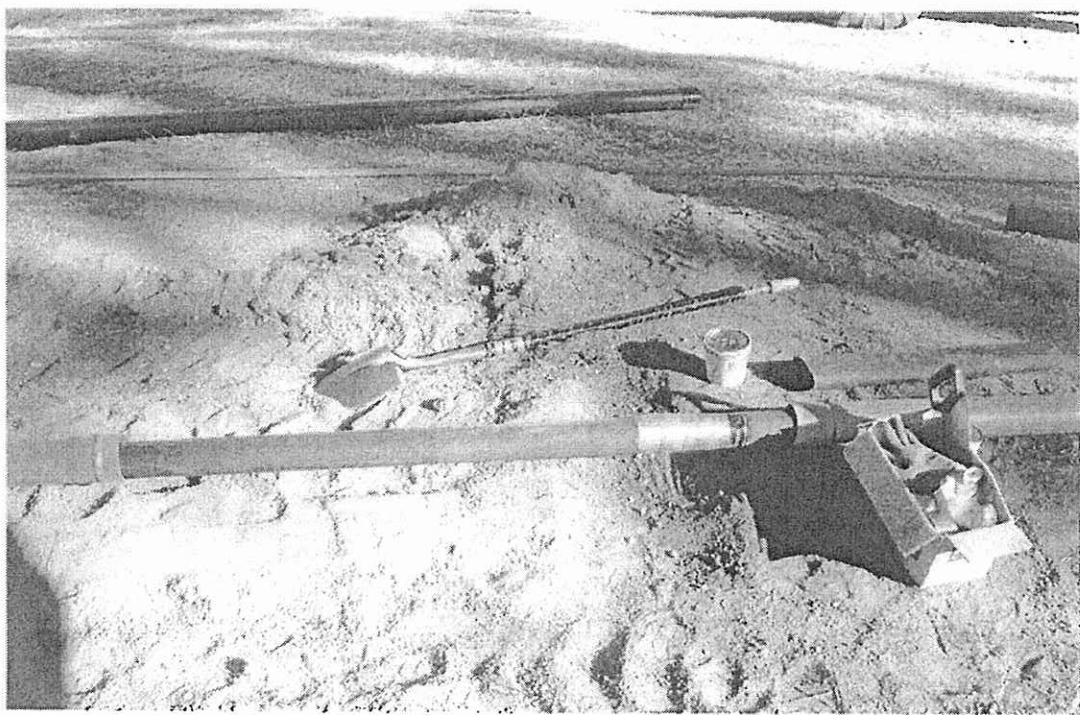
PUMPING & HEATING

QUANTITY 208-888-1973.

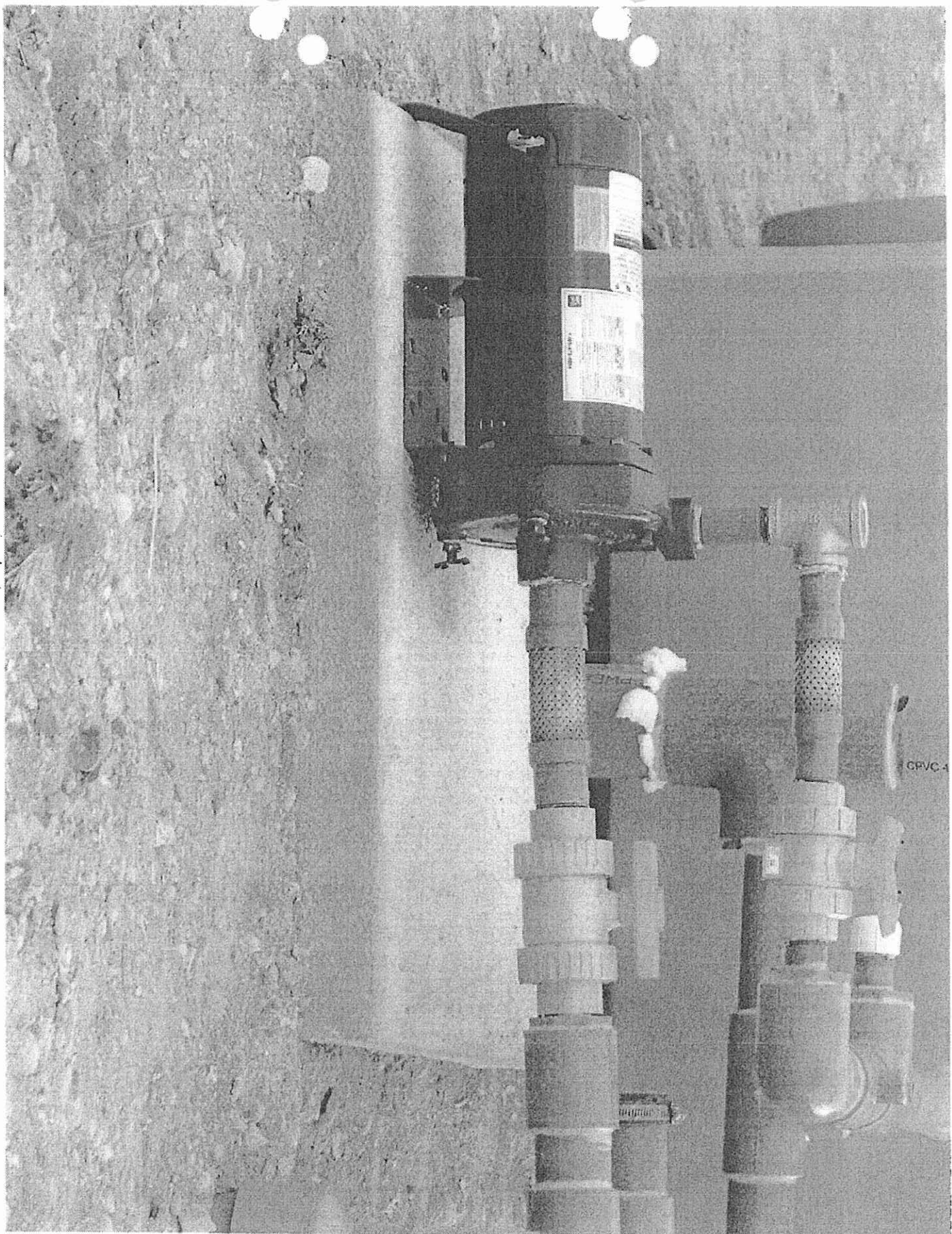








WAC 60001 10-25-06 Pump at hot springs



IDAHO DEPARTMENT OF WATER RESOURCES
Water Permit Report

03/02/2008

WATER RIGHT NO. 65-13912

<u>Owner Type</u>	<u>Name and Address</u>
Current Owner	CAROL LYNN MAC GREGOR 1109 WARM SPRINGS AVE BOISE, ID 83712 (208) 386-9494

Priority Date: 08/02/1999

Status: Active

<u>Source</u>	<u>Tributary</u>
SPRING	MOORES CREEK

<u>Beneficial Use</u>	<u>From</u>	<u>To</u>	<u>Diversion Rate</u>	<u>Volume</u>
COMMERCIAL	01/01	12/31	0.5 CFS	
HEATING	01/01	12/31	0.5 CFS	
Total Diversion			0.5 CFS	

Location of Point(s) of Diversion:

SPRING	NESENE	Sec. 13	Township 13N	Range 03E	VALLEY County
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Place(s) of use:

Place of Use Legal Description: COMMERCIAL VALLEY County

<u>Township</u>	<u>Range</u>	<u>Section</u>	<u>Lot</u>	<u>Tract</u>	<u>Acres</u>	<u>Lot</u>	<u>Tract</u>	<u>Acres</u>	<u>Lot</u>	<u>Tract</u>	<u>Acres</u>	<u>Lot</u>	<u>Tract</u>	<u>Acres</u>
13N	03E	13		SENE										

Date Sent to State Off:

Date Received at State Off:

Other Information:

State or Federal:

Owner Name Connector:

Water District Number: 65

Generic Max Rate per Acre:

Generic Max Volume per Acre:

Swan Falls Trust or Nontrust:

Swan Falls Dismissed:

DLE Act Number:

Cary Act Number:

Mitigation Plan: False

Close



**MUSGROVE
ENGINEERING, P.A.**

David O. Musgrove, P.E. ~ Principal
Charles E. Paulin, P.E. ~ Principal
Bill A. Carter, P.E. ~ Principal



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Boise, Idaho 83705
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OVER 25 YEARS OF EXCELLENCE

July 2, 2008

SPF Water Engineering
600 E. Riverpark Lane
Boise, Idaho 83706

Attention: Terry Scanlan

Re: MacGregor Residence

Per your request, here is my evaluation and review comments on the HVAC heating system at the MacGregor Residence corresponding to Diversion Works Permit # 65-13912 - Conditions No. 8 and #65-13913 - Condition #7. Specifically, I have concentrated on the use and effectiveness of the geothermal hot water system and how it is utilized by the HVAC system.

The building is a two story residence. The first floor consists of an enclosed garage, living space and a kitchen. The upper floor is more living space. I have included the to this report for reference.

The building's heating system is divided into three (3) separate zones as follows:

Lower Floor:	Garage Area	Hot Water Underfloor Radiant Heating System
	Living Area	Hot Water Underfloor Radiant Heating System
Upper Floor	Living Area	Hot Water Fan Coil Heating System

Please reference the attached Main Level and Upper Level Floor Plans for a complete layout of the residence.

The source of this "hot water" is a combination of a geothermal spring and a boiler. I have been informed that during "most" winter time temperature conditions, the geothermal spring alone can deliver adequate BTU's to the system in order to maintain space temperatures. Only during the very coldest of winter temperatures is the boiler necessary for additional heat in order to maintain space temperatures. As shown in the attached system sketches, the geothermal water is piped to ALL systems, but the boiler can ONLY heat the building itself. The boiler is not piped to the hot tub.

I conducted a heating load calculation on the building and arrived at the following space heating needs:

Lower Floor:	Garage Area	24,000 BTU's ***
	Living Area	35,276 BTU's
Upper Floor	Living Area	32,339 BTU's

*** I de-rated the garage area's heating load due to lower acceptable temperatures.

Therefore, I calculated that a total of 91,615 BTU would be necessary to maintain a comfortable inside temperature of 72°F on a design day of -12°F.

According to your letter, the supply pump from the spring is capable of producing 27 GPM.

The formulas for determining the available heat transfer from hot water is as follows:

$BTU's = 500 \text{ (Constant)} \times \text{Flow (GPM)} \times \Delta T \text{ (Change in Temperature)}$

$BTU's = 500 \times 27 \text{ GPM} \times (5^\circ F \text{ to } 10^\circ F \text{ *})$

(* 5°F to 10°F is all that is available due to the fact that all geothermal water must first pass thru the heat exchanger and then it is available for the hot tub. When I inspected the system, the hot water supply to the hot tub was approximately 108°F to 110°F and therefore I have concluded that only 5°F to 10°F was available for the heat exchanger, and hence for "residence heating".)

$BTU's = 67,500 \text{ to } 135,000$

These numbers are very well within line as to what I experienced during my site investigation. The home was being fully heated by ONLY geothermal water, AND the hot tub was at a comfortable temperature of 103°F to 104°F.

One design issue should also be noted is that the domestic water is also being heated by geothermal water. In the mechanical closet, there is a hot water storage tank with an internal double-walled heat exchanger that is the source of hot water for the rest of the facility. There is one exception to this, as there is an inside tub that can be filled directly with geothermal water thru a series of control valves. I understand this is rarely done as it detracts from the rest of the system.

My over all comments on the system are as follows:

Piping System: The workmanship of the piping system was very good. The system had adequate isolation valves and gauges to monitor the system at all critical points. I suggest the piping be labeled and checked for air now and then.

Pumping System: I was unable to confirm pump information at the time of my inspection, but in reviewing the pump curve, it is clear that in conditions of higher head (dirty filter), the flow will be reduced. Besides the main hot spring pump, the circulator seem to be working well. I was a little concerned about the potential for cavitation on the pumps due to the minimal straight piping sections into these pumps, but they all appeared to be running well at the time of my inspection.

Filter System: This is one of the key issues for the entire project. I have spoken with Carol and am working on a new filter upgrade design. I am currently looking at a self-cleaning Rosedale type filter. I will keep you updated on this process and confirm available head with you once a final filter has been selected.



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OVER 25 YEARS OF EXCELLENCE

Heat Exchanger System: The main heat exchanger is a heart of the system and I was unable to gather any identifying information of this piece of equipment. The most important issue here will be approach temperatures versus head loss. Again, it is all about available pressure losses and a good heat exchanger will have a 2 degree approach difference, with a minimal head loss.

Boiler System: The boiler system is a purely "back-up" system as indicated on my attached sketches of the system. During time of normal winter time conditions (such as during the time of my inspection) the boiler will not be necessary to maintain building heat. Remember, the boiler is not connected to the hot tub, so it can not in any way heat the hot tub system.

Insulation System: The last and most easy system to comment on is the insulation system. At the time of my inspection, there was no insulation present on any of these piping systems or equipment. I believe this is a simple upgrade suggestion that will have immediate results in higher performance.

For system improvement recommendations, I do have a few items that should be considered:

#1 Use a "demand controlled" system for the pumping of the geothermal water.

Typical geothermal systems are charged based upon their consumptive use of the geothermal water, and therefore typical system utilize a "demand controlled" system for controlling the amount of flow through the heat exchanger. This type of system is typically controlled by a thermostat on the "house" side of the heat exchanger and when the "house side" of the heat exchanger is satisfied, a control valve on the "well side" will close and eliminate the flow of geothermal water through the heat exchanger.

In the "well side" piping system there is typically a pressure sensor that reacts to this control valve and signals the well pump "vfd" to reduce pump flow or even turn off the pump in times of "no heating demand".

This is a very common design feature in hydronic systems and one that should be considered in this system to reduce overall geothermal water flow and consumption.

#2 Future Heat Exchanger Design – Lower Geothermal Flows By Returning Lower Temperature Water

Currently Boise City "bills" its customers on a "gallon usage" basis. This program gives its building owner customers great incentives to efficiently utilize as much of the heat available as possible. If the total geothermal water usage is also the primary concern on this system, then taking as much temperature as possible from a lesser amount of water should be the primary goal of the system.

This great challenge is the critical component of heat exchanger selection. As a greater temperature differential will significantly change the working temperatures and flows of the installed system on the "house side", I suggest this existing system be left alone. However, in all future uses of the geothermal system, I suggest maximizing the heat to be extracted from the system and reducing the flow as much as possible.



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#3 Hot Tub Water Use

The current design is to provide a continuous flow of geothermal water through the hot tub for both a controlled temperature and "mineral water" environment. The system has no "demand control" and is 100% flow 100% of the time.

In HVAC systems, a demand control system can be utilized with automatic temperature sensors and predictable "recovery times". In the hot tub situation, I am not sure how to model the recovery time from an "un-occupied condition" to an "occupied condition", but I believe it would be a prudent item to review and implement in the future. Almost all standard hot tubs are provided with both "economy" and "standard" control settings, and a similar setting on this system could greatly reduce the flow during non-hot tub use times.

In summary, I can confirm with load calculations and by an actual site inspection that the geothermal water is able to heat the building AND maintain the hot tub at comfortable conditions during mild winter temperatures. In more severe winter conditions, a boiler has been installed in the system to supplement the geothermal heat and together they can adequately maintain a comfort level in both the building and the hot tub.

I do have a few suggestions to improve the efficiency of the system as noted above and even a suggestion on a more effective use on all future geothermal water systems.

Please review the attached floor plans and system piping plans and load calculations and call if you have any questions.

Respectfully,

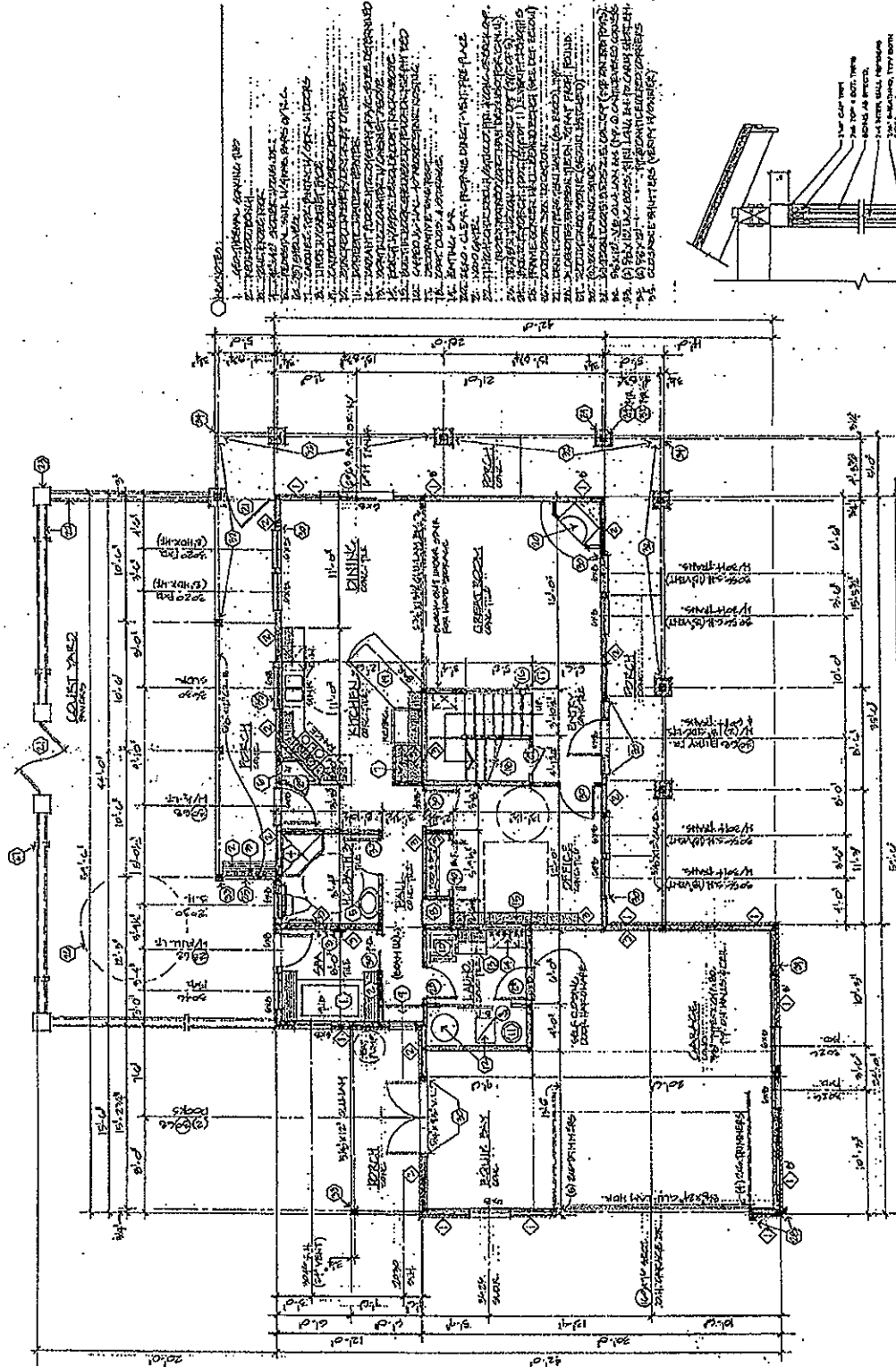


Bill Carter, P.E.



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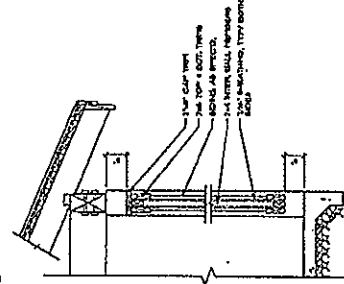
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MAIN LEVEL FLOOR PLAN
SCALE: 1/4" = 1'-0" 11/16" depth



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දෙනු ලබයි.



SCREEN WALL DETAIL
SCALE: 3/4" = 1'-0"



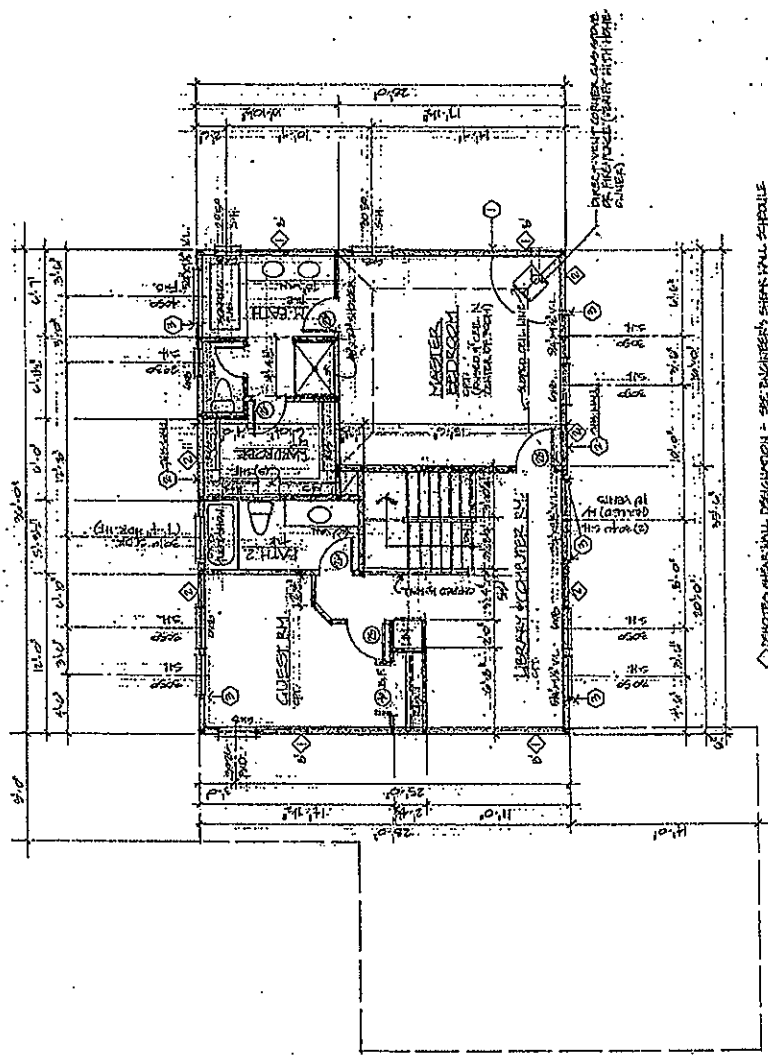
SHEET NO. 8 OF 12

DATE: 10/15/2010
DRAWN BY: JLM
CHECKED BY: JLM
PROJECT: 100-100000

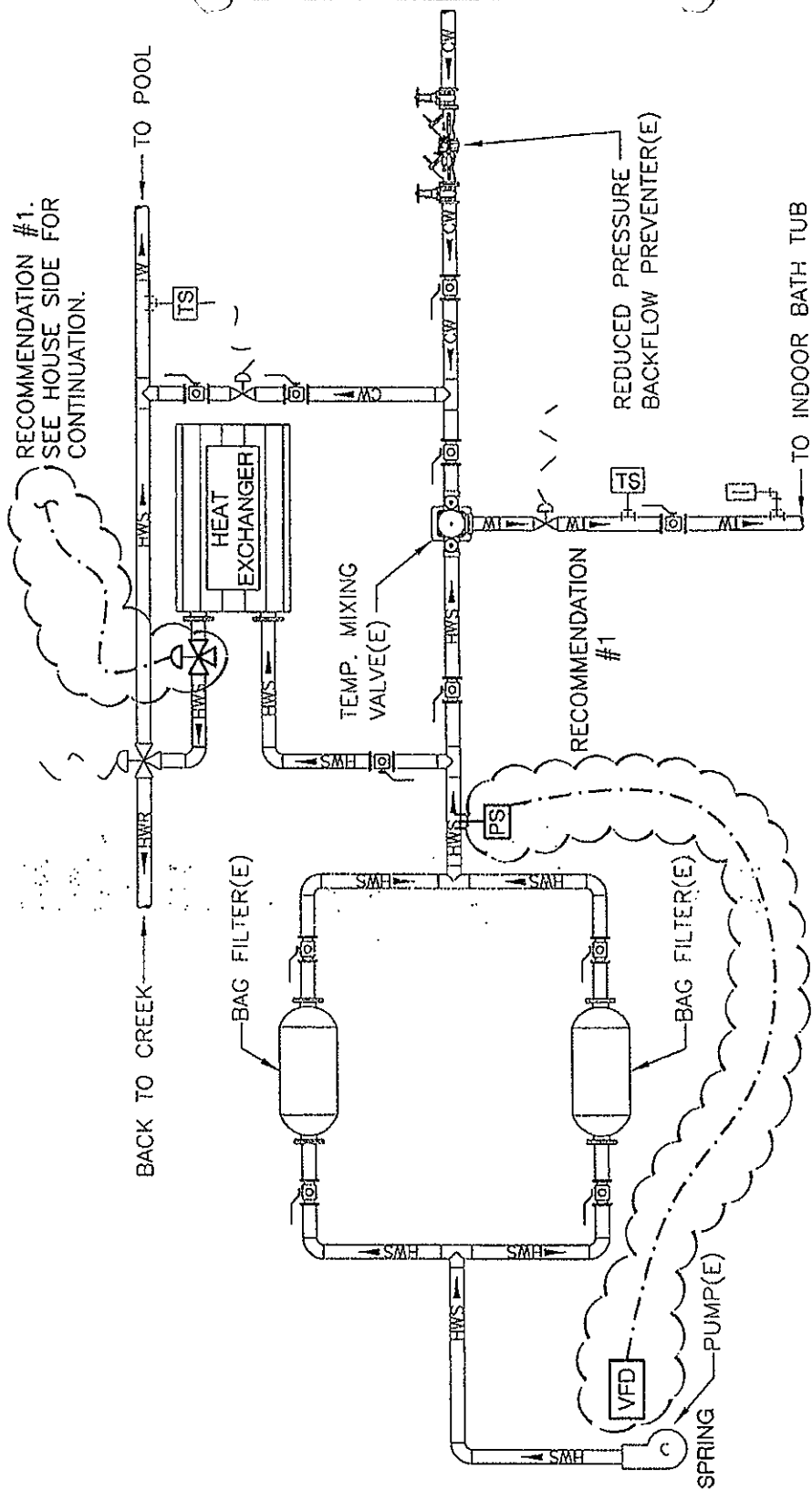
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CAROL MACGREGOR
CASCADE, IDAHO
STAGE CO. 3512 OVERLAND RD. STE. 101, BOISE, ID 83706
(8) 321-0777

RESIDENTIAL DESIGN STUDIO
Classic Design Co.



UPPER LEVEL FLOOR PLAN
SCALE: 1/8" = 1'-0"
NOTES:
1. UPPER LEVEL FLOOR SHALL BE CONCRETE ON 12" HOLLOW CORE SLABS.
2. ALL WALLS SHALL BE 8" CMU WITH INTERIOR FINISH.
3. ALL FLOORS SHALL BE 2" GYP. BOARD ON 1" INSULATED CONCRETE BOARD.
4. ALL CEILING SHALL BE 5/8" GYP. BOARD ON 1" INSULATED CONCRETE BOARD.
5. ALL ROOF SHALL BE 4" EPS INSULATION ON 2" GYP. BOARD ON 12" HOLLOW CORE SLABS.



GEOHERMAL WATER PIPING SCHEMATIC (WELL SIDE) NTS

**MUSGROVE
ENGINEERING, P.A.**
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 Haver, Idaho 83705
 208.324.0554
 www.musgrovepa.com

DWG. 23-01-0000-000001-001
 project number 08-135

PROJECT NAME

MACGREGOR - HOT SPRINGS SPA

GEOHERMAL WATER PIPING AND

RESIDENCE HYDRONIC PIPING

DRAWN

DLM

CHECKED

BC

SCALE

AS SHOWN

ARCH. PROJECT #

DATE

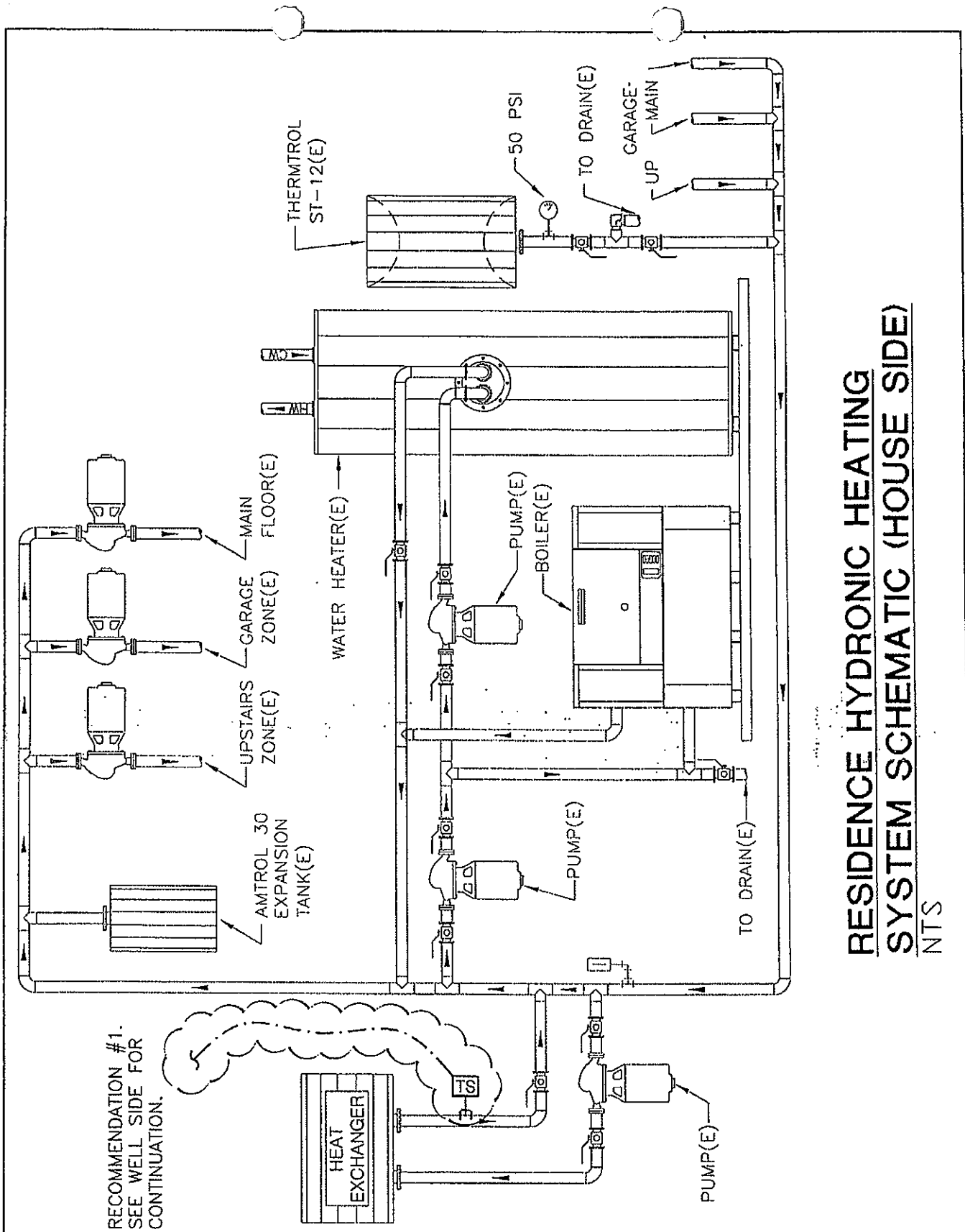
06/11/08

REF. SHEET

SHEET NO.

M-1

RECOMMENDATION #1.
SEE WELL SIDE FOR
CONTINUATION.



RESIDENCE HYDRONIC HEATING SYSTEM SCHEMATIC (HOUSE SIDE) NTS

MUSGROVE
ENGINEERING, P.A.
410 S. Orchard St., Suite 100
Bloomington, IL 61820
708.354.0551
www.musgrove-engineering.com

PROJECT NAME
MACGREGOR - HOT SPRINGS SPA
GEOTHERMAL WATER PIPING AND
RESIDENCE HYDRONIC PIPING

DRAWN
DLM
CHECKED
BC
SCALE
AS SHOWN

ARCH. PROJECT #
DATE
06/11/08
REF. SHEET

SHEET NO.
M-2

Zone Summary

Energy Compliance Calculations (Not Equipment Schedule)

MUSGROVE ENGINEERING, PA 410 S. ORCHARD SUITE 184 BOISE, IDAHO 83705

Zone Summary

PROJECT: McGregor - Hot Springs Spa (4/2)		Design Conditions		Winter	-12	Summer	90
COMPUTED BY: DLM		DATE: 17-Jun-08	CHK BY: BC				
		Heating Load		Sensible		Total Cooling Load	
Zone Reference	FLOOR SQ. FT.	BTUH	KW	BTUH	BTUH	NOMINAL TON (12000-BTUH/TON)	SQ. FT PER NOMINAL TON
1 Garage	720	30,781	9	9,462	9,462	0.8	913.1422573
2 Main Floor	1096	32,194	9	19,128	19,128	1.6	687.5958304
3 Upper Floor	1008	31,673	9	17,839	17,839	1.5	678.0761338
Total Loads =	2824	94,648	28	46,428	46,428	3.9	729.9035197
Energy Compliance Calculations (Not Equipment Schedule)							
Equipment is selected based on next available size							
						Unit Selection	Size
						OSA	TONS
						NUMBER OF PEOPLE	

MUSGROVE ENGINEERING, PA

410 S. ORCHARD SUITE 184 BOISE, IDAHO 83705

PROJECT:	McGregor - Hot Springs Spa (4/21/01)	DATE:	17-Jun-08
COMPUTED BY:	DLM	CHKD. BY:	BC
LOCATION:	Cascade, Idaho	ELEVATION, FT:	4,780

DESIGN TEMPERATURES				
	OUTSIDE TEMP.	INSIDE TEMP.	TEMP. DIFF.	GR/LB DIFF.
WINTER	-12	72	84	
SUMMER	90	75	15	

BUILDING MATERIALS				
WALL	WALL #1		WALL #2	
	MATERIAL	R VALUE	MATERIAL	R VALUE
OUTSIDE AIR SURFACE	15 MPH Wind	0.17	AIR @ 15MPH	0.17
OUTSIDE SURFACE MAT'L				
OUTER SHEATHING MAT'L				
INSULATION	6" Batt	19.00	8" Block perlite filled	2.10
INSIDE SURFACE MAT'L	5/8" GYP BRD	0.78		
INSIDE AIR SURFACE	Still Horizontal	0.61	STILL AIR	0.68
OTHER				
OTHER				
"R" TOTAL		20.56		2.95
"U" = 1/R TOTAL		0.049		0.339
FLOOR / ROOF	FLOOR		ROOF	
	MATERIAL	R VALUE	MATERIAL	R VALUE
OUTSIDE AIR SURFACE			AIR @ 15MPH	0.17
OUTSIDE SURFACE MAT'L				
OUTER SHEATHING MAT'L				
INSULATION			R-30	30.00
INSIDE SURFACE MAT'L				
INSIDE AIR SURFACE			STILL AIR	0.61
OTHER				
OTHER				
"R" TOTAL		slab on grade		30.78
"U" = 1/R TOTAL		slab on grade		0.03
GLASS TYPE	U VALUE	SC VALUE	DOOR TYPE	U VALUE
Double Paned	0.59	0.60	Door	0.60

ZONE WORKSHEET

MUSGROVE ENGINEERING, PA

410 S. ORCHARD SUITE 184 BOISE, IDAHO 83705

Zone Form

PROJECT:	<i>McGregor - Hot Springs Spa (</i>		CHK BY:	BC
COMPUTED BY:	DLM		DATE:	17-Jun-08
ZONE	<i>Garage</i>			1
WALLS	WIDTH (FT)	HEIGHT (FT)	MISC. (FT2)	TOTAL (FT2)
NORTH	30	8		240
N.E. WALL				0
EAST WALL	15	8		120
S.E. WALL				0
SOUTH WALL	14	8		112
S.W. WALL				0
WEST WALL	24	8		192
N.W. WALL				0
WINDOWS	WIDTH (FT)	HEIGHT (FT)	MISC. (FT2)	TOTAL (FT2)
NORTH				0
N.E. WINDOW				0
EAST WINDOW				0
S.E. WINDOW				0
SOUTH WINDOW			9	9
S.W. WINDOW				0
WEST WINDOW			18	18
N.W. WINDOW				0
TOTAL DOOR (FT2)		OSA PER PERSON		SENSIBLE HEAT
266		15		255
ZONE SQUARE FOOTAGE		ROOF SQUARE FOOTAGE		LATENT HEAT
720		720		255
No. of PEOPLE		No. of COMPUTERS		WALL HEIGHT
0		0		8
TOTAL EQUIP. LOAD (BTU)		LIGHTS (W/FT2)		AIR CHNG RATE/HR
0		0.7		1

ZONE WORKSHEET

MUSGROVE ENGINEERING, PA

410 S. ORCHARD SUITE 184 BOISE, IDAHO 83705

Zone Form

PROJECT:	<i>McGregor - Hot Springs Spa (</i>		CHK BY:	BC
COMPUTED BY:	DLM		DATE:	17-Jun-08
ZONE	<i>Main Floor</i>			2
WALLS	WIDTH (FT)	HEIGHT (FT)	MISC. (FT2)	TOTAL (FT2)
NORTH	12	8		96
N.E. WALL				0
EAST WALL	44	8		352
S.E. WALL				0
SOUTH WALL	28	8		224
S.W. WALL				0
WEST WALL	35	8		280
N.W. WALL				0
WINDOWS	WIDTH (FT)	HEIGHT (FT)	MISC. (FT2)	TOTAL (FT2)
NORTH			39	39
N.E. WINDOW				0
EAST WINDOW			78	78
S.E. WINDOW				0
SOUTH WINDOW			18	18
S.W. WINDOW				0
WEST WINDOW			105	105
N.W. WINDOW				0
TOTAL DOOR (FT2)	OSA PER PERSON		SENSIBLE HEAT	
0	15		255	
ZONE SQUARE FOOTAGE	ROOF SQUARE FOOTAGE		LATENT HEAT	
1096	88		255	
No. of PEOPLE	No. of COMPUTERS		WALL HEIGHT	
0	0		8	
TOTAL EQUIP. LOAD (BTU)	LIGHTS (W/FT2)		AIR CHNG RATE/HR	
0	0.7		1	

COOLING LOAD CALCULATION

MUSGROVE ENGINEERING, PA

410 S. ORCHARD SUITE 184 BOISE, IDAHO 83705

PROJECT:		McGregor - Hot Springs Spa (4/21/08)				1	
COMPUTED BY:		DLM		DATE: 17-Jun-08		CHK BY: BC	
ZONE:		Garage		DESIGN TIME:		5 PM	
WINTER TEMP	-12	SUMMER TEMP	90	LOCATION		Cascade, Idaho	
WINTER TEMP DIFF	84	1 WALL U VLU	0.049	FLOOR VALUE		slab on grade	
SUMMER TEMP DIFF	15	2 WALL U VLU	0.339	ROOF U VALUE		0.032	
GLASS U VALUE	0.59	GLASS S.C.	0.60	DOOR U VALUE		0.60	
TRANSMISSION & SOLAR HEAT GAIN							
COMPONENT	G. AREA (FT2)	A. AREA (FT2)	TEMP. DIFF (DEG. F)	"U" FACTOR	SENSIBLE	LATENT	
ROOF	720	720	62	0.032	1450		
NORTH WALL	240	1 240	25	0.049	292		
N.E. WALL	0	1 0	25	0.049	0		
EAST WALL	120	1 120	27	0.049	158		
S.E. WALL	0	1 0	27	0.049	0		
SOUTH WALL	112	1 103	31	0.049	155		
S.W. WALL	0	1 0	61	0.049	0		
WEST WALL	192	1 174	72	0.049	609		
N.W. WALL	0	1 0	55	0.049	0		
GLASS TRANS.	27	27	15	0.59	239		
DOORS	266	266	15	0.60	2394		
FLOOR AREA	720						
COMPONENT	AREA (FT2)	SHGF	CLF	SC			
N. GLASS SOLAR	0	37	0.75	0.60	0		
N.E. GLASS SOLAR	0	159	0.23	0.60	0		
EAST GLASS SOLAR	0	215	0.23	0.60	0		
S.E. GLASS SOLAR	0	179	0.29	0.60	0		
S. GLASS SOLAR	9	128	0.41	0.60	283		
S.W. GLASS SOLAR	0	179	0.59	0.60	0		
W. GLASS SOLAR	18	215	0.56	0.60	1300		
N.W. GLASS SOLAR	0	159	0.51	0.60	0		
SKYLIGHT SOLAR		254	0.56	0.60	0		
INTERNAL HEAT GAIN							
PEOPLE=	0						
CFM/PERSON=	15						
	255	X (SENSIBLE)	255	X (LATENT)	0	0	
LIGHTS	0.7	W/FT2	504	3.414	1721		
COMPUTERS	0	200 WATTS	0	3.414	0		
MISC. EQUIP.	0.0	W/FT2	0	3.414	0		
KITCHEN EQUIP.							
OUTSIDE AIR HEAT GAIN							
ENERGY TYPE	CFM			CONSTANT			
SENSIBLE:	0	15	F	0.99	0		
LATENT:	0		GR/LB	0.68		0	
SUBTOTAL					8602	0	
SAFETY FACTOR=					10%	860	
TOTAL HEAT GAIN					9462	0	
GRAND TOTAL					BTUH	9462	
TOTAL BTUH					TONS	0.79	
TOTAL TONS					FT2/TON	913	
PROJECT BLOCK LOAD		TOTAL SQUARE FT.		720			
		TOTAL BTUH		9462			
		TOTAL TONS		0.79			

MUSGROVE ENGINEERING, PA

410 S. ORCHARD SUITE 184 BOISE, IDAHO 83705

PROJECT:		McGregor - Hot Springs Spa (4/21/08)				2									
COMPUTED BY:		DLM		DATE: 17-Jun-08		CHK BY: BC									
ZONE:		Main Floor		DESIGN TIME:		5 PM									
WINTER TEMP	-12	SUMMER TEMP	90	LOCATION		Cascade, Idaho									
WINTER TEMP DIFF	84	1 WALL U VLU	0.049	FLOOR VALUE		slab on grade									
SUMMER TEMP DIFF	15	2 WALL U VLU	0.339	ROOF U VALUE		0.032									
GLASS U VALUE	0.59	GLASS S.C	0.60	DOOR U VALUE		0.60									
TRANSMISSION & SOLAR HEAT GAIN															
COMPONENT	G. AREA (FT2)	A. AREA (FT2)	TEMP. DIFF (DEG. F)	"U" FACTOR	SENSIBLE	LATENT									
ROOF	88	88	62	0.032	177										
NORTH WALL	96	1 57	25	0.049	69										
N.E. WALL	0	1 0	25	0.049	0										
EAST WALL	352	1 274	27	0.049	360										
S.E. WALL	0	1 0	27	0.049	0										
SOUTH WALL	224	1 206	31	0.049	311										
S.W. WALL	0	1 0	61	0.049	0										
WEST WALL	280	1 175	72	0.049	613										
N.W. WALL	0	1 0	55	0.049	0										
GLASS TRANS.	240	240	15	0.59	2124										
DOORS	0	0	15	0.60	0										
FLOOR AREA	1096														
COMPONENT	AREA (FT2)	SHGF	CLF	SC											
N. GLASS SOLAR	39	37	0.75	0.60	649										
N.E. GLASS SOLAR	0	159	0.23	0.60	0										
EAST GLASS SOLAR	78	215	0.23	0.60	2314										
S.E. GLASS SOLAR	0	179	0.29	0.60	0										
S. GLASS SOLAR	18	128	0.41	0.60	567										
S.W. GLASS SOLAR	0	179	0.59	0.60	0										
W. GLASS SOLAR	105	215	0.56	0.60	7585										
N.W. GLASS SOLAR	0	159	0.51	0.60	0										
SKYLIGHT SOLAR		254	0.56	0.60	0										
INTERNAL HEAT GAIN															
PEOPLE=	0														
CFM/PERSON=	15														
	255	X (SENSIBLE)	255	X (LATENT)	0	0									
LIGHTS	0.7	W/FT2	767.2	3.414	2619										
COMPUTERS	0	200 WATTS	0	3.414	0										
MISC. EQUIP.	0	W/FT2	0	3.414	0										
KITCHEN EQUIP.															
OUTSIDE AIR HEAT GAIN															
ENERGY TYPE	CFM			CONSTANT											
SENSIBLE:	0	15	F	0.99	0										
LATENT:	0		GR/LB	0.68		0									
					SUBTOTAL	17389	0								
SAFETY FACTOR=					10%	1739	0								
TOTAL HEAT GAIN						19128	0								
GRAND TOTAL					BTUH	19128									
					TONS	1.59									
TOTAL LOAD					FT2/TON	688									
<table border="1"> <tr> <td colspan="2">PROJECT BLOCK LOAD</td> </tr> <tr> <td>TOTAL SQUARE FT.</td> <td>1816</td> </tr> <tr> <td>TOTAL BTUH</td> <td>28589</td> </tr> <tr> <td>TOTAL TONS</td> <td>2.38</td> </tr> </table>								PROJECT BLOCK LOAD		TOTAL SQUARE FT.	1816	TOTAL BTUH	28589	TOTAL TONS	2.38
PROJECT BLOCK LOAD															
TOTAL SQUARE FT.	1816														
TOTAL BTUH	28589														
TOTAL TONS	2.38														

MUSGROVE ENGINEERING, PA

410 S. ORCHARD SUITE 184 BOISE, IDAHO 83705

PROJECT:		McGregor - Hot Springs Spa (4/21/08)				3	
COMPUTED BY:		DLM		DATE: 17-Jun-08		CHK BY: BC	
ZONE:		Upper Floor		DESIGN TIME:		5 PM	
WINTER TEMP	-12	SUMMER TEMP	90	LOCATION		Cascade, Idaho	
WINTER TEMP DIFF	84	1 WALL U VLU	0.049	FLOOR VALUE		slab on grade	
SUMMER TEMP DIFF	15	2 WALL U VLU	0.339	ROOF U VALUE		0.032	
GLASS U VALUE	0.59	GLASS S.C.	0.60	DOOR U VALUE		0.60	
TRANSMISSION & SOLAR HEAT GAIN							
COMPONENT	G. AREA (FT2)	A. AREA (FT2)	TEMP. DIFF (DEG. F)	"U" FACTOR	SENSIBLE	LATENT	
ROOF	1008	1008	62	0.032	2030		
NORTH WALL	224	199	25	0.049	242		
N.E. WALL	0	0	25	0.049	0		
EAST WALL	288	226	27	0.049	297		
S.E. WALL	0	0	27	0.049	0		
SOUTH WALL	224	215	31	0.049	324		
S.W. WALL	0	0	61	0.049	0		
WEST WALL	288	204	72	0.049	714		
N.W. WALL	0	0	55	0.049	0		
GLASS TRANS.	180	180	15	0.59	1593		
DOORS	0	0	15	0.60	0		
FLOOR AREA	1008						
COMPONENT	AREA (FT2)	SHGF	CLF	SC			
N. GLASS SOLAR	25	37	0.75	0.60	416		
N.E. GLASS SOLAR	0	159	0.23	0.60	0		
EAST GLASS SOLAR	62	215	0.23	0.60	1840		
S.E. GLASS SOLAR	0	179	0.29	0.60	0		
S. GLASS SOLAR	9	128	0.41	0.60	283		
S.W. GLASS SOLAR	0	179	0.59	0.60	0		
W. GLASS SOLAR	84	215	0.56	0.60	6068		
N.W. GLASS SOLAR	0	159	0.51	0.60	0		
SKYLIGHT SOLAR	0	254	0.56	0.60	0		
INTERNAL HEAT GAIN							
PEOPLE=	0						
CFM/PERSON=	0						
	255	X (SENSIBLE)	255	X (LATENT)	0	0	
LIGHTS	0.7	W/FT2	705.6	3.414	2409		
COMPUTERS	0	200 WATTS	0	3.414	0		
MISC. EQUIP.	0	W/FT2	0	3.414	0		
KITCHEN EQUIP.							
OUTSIDE AIR HEAT GAIN							
ENERGY TYPE	CFM			CONSTANT			
SENSIBLE	0	15	F	0.99	0		
LATENT	0		GR/LB	0.68		0	
					SUBTOTAL	16217	0
						1622	0
						17839	0
PROJECT BLOCK LOAD							
TOTAL SQUARE FT.	2824	TOTAL HEAT GAIN		BTUH	17839		
TOTAL BTUH	46428	GRAND TOTAL		TONS	1.49		
TOTAL TONS	3.87	TOTAL LOAD		FT2/TON	678		

HEATING LOAD CALCULATION

MUSGROVE ENGINEERING, PA

410 S. ORCHARD SUITE 184 BOISE, IDAHO 83705

PROJECT:		McGregor - Hot Springs Spa (4/21/08)		1	
COMPUTED BY:		DLM		DATE: 17-Jun-08	
ROOM:		Garage		CHKD BY: BC	
				DESIGN TIME: 5	
WINTER TEMP	-12	SUMMER TEMP	90	LOCATION	Cascade, Idaho
WINTER TEMP DIFF	84	WALL U-VAL	0.049	FLOOR VALUE	slab on grade
SUMMER TEMP DIFF	15	WALL U-VAL	0.338983051	ROOF U-VALUE	0.03
GLASS U-VALUE	0.59	GLASS S.C.	0.60	DOOR U-VALUE	0.60
TRANSMISSION HEAT LOSS					
COMPONENT	G. AREA (FT2)	A. AREA (FT2)	TEMP. DIFF (DEG. F)	"U" FACTOR	BTUH
ROOF	720	720	84	0.03	1965
WALLS	664	637	84	0.05	2603
GLASS	27	27	84	0.59	1338
DOORS	266	266	84	0.60	13406
FLOOR	720	720	30	0.00	0
PERIMETER		AVERAGE HEAT LOSS BELOW GRADE		TEMP. DIFFERENCE	
BASEMENT WALLS		0.542		84	0
HEAT LOSS COEFFICIENT		AREA		TEMP. DIFFERENCE	
BASEMENT FLOORS		0.025		84	0
HEAT LOSS @ GRADE		PERIMETER		TEMP. DIFFERENCE	
CONC. FLOOR @ GRADE		83		84	3486
INFILTRATION HEAT LOSS					
VOLUME (FT3)	AIR CHANGE RATE	CONSTANT	TEMP. DIFFERENCE		
5760	0.0167	0.99	84		7983
INFILTRATION WALL HEIGHT=	8				
OUTSIDE AIR HEAT LOSS					
CFM	TEMP. DIFFERENCE	CONSTANT			
0	84	0.99			0
OUTSIDE AIR					
INFILTRATION HEAT LOSS				SUBTOTAL	30781
TOTAL BTUH	30781	BTUH		30781	
TOTAL KW	9.02	KW		9	
		BTU/FT2		43	

HEATING LOAD CALCULATION

MUSGROVE ENGINEERING, PA

410 S. ORCHARD SUITE 184 BOISE, IDAHO 83705

PROJECT:	McGregor - Hot Springs Spa (4/21/08)			2
COMPUTED BY:	DLM	DATE:	17-Jun-08	CHKD BY: BC
ROOM:	Main Floor			DESIGN TIME: 5
WINTER TEMP:	-12	SUMMER TEMP:	90	LOCATION: Cascade, Idaho
WINTER TEMP DIFF:	84	WALL U VLU:	0.049	FLOOR VALUE: slab on grade
SUMMER TEMP DIFF:	15	WALL U VLU:	0.338983051	ROOF U VALUE: 0.03
GLASS U VALUE:	0.59	GLASS S.C.:	0.60	DOOR U VALUE: 0.60
TRANSMISSION HEAT LOSS				
COMPONENT	G. AREA (FT2)	A. AREA (FT2)	TEMP. DIFF (DEG. F)	"U" FACTOR
ROOF	88	88	84	0.03
WALLS	952	712	84	0.05
GLASS	240	240	84	0.59
DOORS	0	0	84	0.60
FLOOR	1096	1096	30	0.00
PERIMETER AVERAGE HEAT LOSS BELOW GRADE				
BASEMENT WALLS		0.542	84	0
HEAT LOSS COEFFICIENT AREA TEMP. DIFFERENCE				
BASEMENT FLOORS	0.025		84	0
HEAT LOSS @ GRADE PERIMETER TEMP. DIFFERENCE				
CONC. FLOOR @ GRADE	0.5	119	84	4998
INFILTRATION HEAT LOSS				
	VOLUME (FT3)	AIR CHANGE RATE	CONSTANT	TEMP. DIFFERENCE
INFILTRATION	8768	0.0167	0.99	84
WALL HEIGHT=	8			
OUTSIDE AIR HEAT LOSS				
	CFM	TEMP. DIFFERENCE	CONSTANT	
OUTSIDE AIR	0	84	0.99	0
INFILTRATION HEAT LOSS				SUBTOTAL
TOTAL BTUH	32194			BTUH 32194
TOTAL KW	9.43			KW 9
				BTU/FT2 29

HEATING LOAD CALCULATION

MUSGROVE ENGINEERING, PA

410 S. ORCHARD SUITE 184 BOISE, IDAHO 83705

PROJECT:	McGregor - Hot Springs Spa (4/21/08)			3
COMPUTED BY:	DLM	DATE:	17-Jun-08	CHKD BY: BC
ROOM:	Upper Floor			DESIGN TIME: 5
WINTER TEMP:	-12	SUMMER TEMP:	90	LOCATION: Cascade, Idaho
WINTER TEMP DIFF:	84	WALL U VLU	0.049	FLOOR VALUE: slab on grade
SUMMER TEMP DIFF:	15	WALL U VLU	0.338983051	ROOF U VALUE: 0.03
GLASS U VALUE:	0.59	GLASS S.C.	0.60	DOOR U VALUE: 0.60
TRANSMISSION HEAT LOSS				
COMPONENT	G. AREA (FT2)	A. AREA (FT2)	TEMP. DIFF (DEG. F)	"U" FACTOR
ROOF	1008	1008	84	0.03
WALLS	1024	844	84	0.05
GLASS	180	180	84	0.59
DOORS	0	0	84	0.60
FLOOR	1008	1008	30	0.00
BASEMENT WALLS				
PERIMETER	AVERAGE HEAT LOSS BELOW GRADE		TEMP. DIFFERENCE	BTUH
	0.542		84	0
BASEMENT FLOORS				
HEAT LOSS COEFFICIENT	AREA		TEMP. DIFFERENCE	BTUH
0.025			84	0
CONC. FLOOR @ GRADE				
HEAT LOSS @ GRADE	PERIMETER		TEMP. DIFFERENCE	BTUH
0.5	128		84	5376
INFILTRATION HEAT LOSS				
VOLUME (FT3)	AIR CHANGE RATE	CONSTANT	TEMP. DIFFERENCE	BTUH
8064	0.0167	0.99	84	11177
WALL HEIGHT= 8				
OUTSIDE AIR HEAT LOSS				
CFM	TEMP. DIFFERENCE		CONSTANT	BTUH
0	84		0.99	0
INFILTRATION HEAT LOSS				
SUBTOTAL				31673
TOTAL BTUH	31673	BTUH		31673
TOTAL KW	9.28	KW		9
				BTU/FT2 31