Belleayre Mountain Ski Center UMP-DEIS

Appendix D
Potable Water Engineers Report

January, 2004

Prepared by:

New York State Department of Environmental Conservation
Division of Operations – Bureau of Design & Construction
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Engineer's Report

NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF OPERATIONS
BUREAU OF DESIGN AND CONSTRUCTION
625 Broadway, 3rd Floor, Albany, NY 12233-5252
(518) 402-9084

New Well System
BELLEAYRE MOUNTAIN SKI CENTER
WELL WATER SYSTEM
Project No. 02-2236
Town of Shandaken
Ulster County

Jan, 2004
prepared by
Donald E. Tuxill, P.E.

Program Unit: Recreation

INTRODUCTION

The Belleayre Mountain Ski Center is located in the Town of Shandaken, Ulster County, New York. The ski center is owned and operated by New York State Department of Environmental Conservation's Operations Division. The facility, which is located on approximately 2,165 acres of state land, provides skiing facilities for approximately 100,000 skiers annually, and employs approximately 300 people over the course of a year. The facility is designed to accommodate a transient population of approximately 6,000 people (skiers) and a non-transient population of approximately 300 people (employees) daily. The proposed modifications described herein are being made to alleviate potential problems with surface water infiltration in either the groundwater source, or the storage vessel. This new potable water system is being constructed for the immediate purpose of dealing with those problems associated with the current system that feeds the lower and upper lodges. The system that feeds the summit lodge is connected to its own well that provides potable water, and is chlorinated on site. Once the long range plan (or Unit Management Plan) is finalized, any modifications that would incorporate changes at the summit will be addressed with the Department of Health.

CALCULATIONS

Design Flow

As the schematic process diagram (Drawing 9 - enclosed) shows, there are two main points of consumption of water – the lower lodge (or Discovery Lodge) and the upper lodge (or Overlook Lodge). There is no other point of consumption at the lower lodge than the building itself, and its actual historical maximum daily flow there is recorded as being 26,250 gpd (gallons per day). The upper lodge, however, itself feeds to the long house. The lift maintenance building (or carpenter's shop) and the nursery, both branch off of the distribution line after the chlorination process, but before entering the upper lodge. The historical maximum daily flow at the upper lodge is recorded as being 33,000 gpd. The historical maximum daily flow for both buildings is 54,000 gpd.

For the nursery and the lift maintenance building, it is assumed that 10 people are at either building. Assuming 15 gpd/person for each building as an average, and a peak factor of 2, each building would be assumed to have a maximum daily flow of 15 gpd/person x 10 people x 2 (p.f.) = 300 gpd for each building.

Therefore, the design flow for the entire facility that will be connected to these wells and this system is 54,000 gpd + 3 buildings x 300 gpd/building = 54,900 gpd.

Though the well yield to meet this maximum daily demand is 54,900 gpd/8hrs/60 mins = 114 gpm, the following is data regarding each well [Please note that the wells have the ability to handle this load, potentially pumping over a 10.5 hr time frame, and recognizing the buffer that is there with the 150,000 gallon storage].

The newly drilled wells will provide 50 gpm + 13 gpm + 22 gpm = 85 gpm (operating at 2/3 the well yield) >> 37 gpm. Note that the pumps will be installed so that the 13 gpm and the 22 gpm wells will run as a pair, and the 50 gpm well will run independently, though all three will run if supply is running behind demand when only the two wells are operating (35 gpm).

As the attached well logs, spreadsheets and pump curves show, the following design data has been arrived at as the well pumps to be utilized for this system. Note that the wells are manifolded together for a single 4" o.d. SDR 9 HDPE line from the chlorination building to the storage tanks.

The pumps were designed with an outlet head (at the chlorination building) equal to the dynamic and elevational head of pumping at 85 gpm from the chlorination building up into the 100,000 gallon lower storage tank in the 4" pipeline. All pumps used will be stainless steel Grundfos pumps, and will be installed with the following design data:

WELL NO.	FLOW (GPM)	WELL DEPTH (FT)	PUMP ELEV (FT)	PIPE DIAM (IN)	TDH (FT)	PUMP SIZE (HP)
1	22	-348	-320	2	575	5
2	50	-497	-300	3	625	15
3	13	-498	-450	2	733	5

WELL NO.	MODEL NO.	WELL DRAWDOWN ELEV (FT)
1	25S50-26	-200
2	40S150-37DS	-160
3	10S50-58DS	-350

DISCUSSION

Proposed system

The proposed plan for the potable water system for Belleayre Ski Center is for the newly developed wells to be manifolded together to provide one water transmission line, that will be pumped by the three well pumps to the newly installed 100,000 gallon storage tank. From this tank, both the lower lodge will draw water, as well as provide a source to be pumped via transmission in-line pumps to the 50,000 gallon storage tank. From that tank, the upper lodge (and subsequent buildings) as well as the nursery, garage and lift maintenance building will draw its supply. All existing reservoirs will be totally physically severed from the potable water system for Belleayre. The existing wells near the upper reservoir and upper lodge will be abandoned as part of this project. The existing well near the lower tank (well # 4) will be disconnected from the system, but will be available to be re-connected for make-up water manually (with Ulster County Department Of Health (UCDOH) notified, and water boiled), on an as-needed emergency basis. The level detection system for the upper tank will control whether or not water is pumped from the lower tank. The level detection system for the lower tank will control whether or not water is pumped from the wells to the lower tank. Chlorine content for the raw potable water will be monitored at the tank, with a 2 ppm chlorine level set, prior to storage in the tank. Adjusting chlorine levels will happen only at the chlorination building, and will be done manually, as a result of the information gathered.

The existing post-storage and pre-consumption chlorination system will remain intact, utilizing the two (2) separate existing systems and buildings for this.

Proposed treatment process – disinfection by chlorination.

It is proposed to install a flow metered chlorine dosing station proximate to the new wells, where the three (3) wells will be manifolded together to form one transmission main (see attached Drawing 12).Well numbers 1 & 3 will each enter the building via a 2 inch SDR 9 HDPE line, and well number 2 will enter the building via a 3 inch SDR 9 HDPE line, and combine into a 4 inch SDR 9 HDPE line. The chlorine will be flow-paced, and injected into the main via a chlorine injection pump, for liquid sodium hypochlorite solution (12 ½ % concentration).

Assuming a 1:3 dilution of the hypochlorite solution, to obtain a 2 ppm residual in the potable water pumped, the required dosage per hour would be as follows [Note that 12 ½ % is equivalent to 125,000 ppm]:

$\frac{2 \text{ ppm} \times 85 \text{ gpm} \times 60 \text{ min/hr}}{125{,}000 \text{ ppm} \times 1/4}$ = .33 gph of solution injected. The chlorination pump would need

to be able to inject into a line that sees pressure of 160 psi [335 ft of elevation head + 34 ft of dynamic head loss = 369 ft of head = 160 psi], and meet the requirements of .33 gph injection rate. LMI's A941 chlorine pump (see attached cut sheets) was chosen. It can inject against a pressure of up to 250 psi, and has a maximum injection rate of .58 gph. Therefore, the pump would operate at 60% capacity [.35 gph/ .58 gph = .60], and would be flow-paced for injection rates.

The chlorination building is designed to be constructed in two rooms (see attached Drawing 12). One room is to accommodate the plumbing manifold of the three well water lines (along with gate valves and a check valve), the controls for the electrical power system, as well as the electronic monitoring system (see attached process schematic). The other, smaller room is to hold the injection pump, the chlorination solution, and a hose bib for dilution of the solution, as well as wash down. There also is shown an eyewash station, for employees to have available to clear their eyes in an emergency. The water necessary for these two flows will be stored in a pressure rated tank (250 psig) that will hold approximately 120 gallons of water. There will be a pressure reducer, to preclude the possibility of the high pressure in that building damaging either the eye wash station, or the hose bib. Additionally there is space available for future needs, if the presence of minerals in the water now being monitored as a result of being considered a non-transient non-community water system, requires additional treatment to negate that mineral's presence.

As the process schematic diagram shows, the entire system will be monitored at several different places. Chlorine concentration, water flow rate, pump status, gallons pumped, building condition (temperature, security) are all variables that will be transmitted throughout the facility. The places that will be monitored are as follows: outside the 100,000 gallon storage tank, outside the 50,000 gallon storage tank, at the lower lodge, and at the upper lodge. The summit lodge, nursery, lift maintenance building, and garage buildings will all be part of a manual chlorine content monitoring system that will be part of the regular rotation of tests.

As a result of the determination of Belleayre Ski Center being considered a non-transient non-community water supply, there are several non-infrastructure issues that will be addressed. Level C certification for an assistant operator, as well as the various different testing that will need to happen for various minerals, and bacteria tests will all be instituted as a result of the Health Department's decision on this matter.

NYSDEC will be providing to UCDOH the necessary test results for the new wells, that goes beyond what was previously submitted, to meet requirements for a NTNC water system. These

wells will be tested at that level, once the proposed pumps and piping are installed in the wells, the wells disinfected, and ready for sampling. Testing for well number 4, and the summit well will also be done at this level. If modifications need to be made in treatment in light of those results, that will occur.

Chlorine Contact Time

Post 2003 Season:

After the 2003 season, the entire system for both the upper and lower lodges will be connected. The contact time for disinfection will occur while the water is stored in either the 100,000 gallon or 50,000 gallon tank. For the most extreme day, there will be a total of 54,000 gpd, which is based on a maximum attendance of 6,000 skiers. For the 10 year projections for the facility, 9,000 skiers are envisioned, which would yield a maximum flow of 81,000 gpd. For the wells operating at 85 gpm (for all 3), it would take approximately 16 hrs to replenish the supply. For that flow, 81,000 gpd over 8hrs, the peak flow would be 169 gpm. For 30 minute contact time, that would require 5,063 gallons of storage. With the storage tanks for the two lodges equalling 150,000 gallons, there is more than adequate amount of storage for disinfection contact time.

2003 Season:

For this season, prior to the completion of this project, the upper lodge and lower lodge will be operated independently, except for emergency make-up water for the upper lodge being provided from the lower reservoir and well. The chlorination prior to storage will not be in place for the 2003 season. Chlorination will only take place after storage, so the extra capacity for disinfection will be what was installed and/or analyzed in 1992. The storage available at that time for disinfection amounts to the following:

Lower Lodge:
Vol. Of existing transmission line = 685 gal (per 1992 engineer's report by AJ Niles)

Upper Lodge
Vol. Of existing transmission line = 555 gal + 281 gal = 836 gal (per 1992 engineer's report by AJ Niles)

Based on this data, the actual contact time experienced by the water for each of the main lodges is reflected below:

DAYS OF CONTACT TIME IN GIVEN RANGE

Location	Season	>30 minutes	25 to 30 minutes	20 to 25 minutes	15 to 20 minutes	10 to 15 minutes	5 to 10 minutes
Upper Lodge	2000-2001	127	9	3	1	1	1*
Upper Lodge	2001-2002	79	44	22	0	0	0
Upper Lodge	2002-2003	144	2	0	0	0	0
Lower Lodge	2000-2001	124	11	5	2	0	0

Lower Lodge	**2001-2002**	**140**	**5**	**0**	**0**	**0**	**0**
Lower Lodge	**2002-2003**	**131**	**10**	**5**	**0**	**0**	**0**

*-this recorded event reflects a section of the records that are questionable (~75,000 gpd for the upper lodge only) and are a reflection of either an error in data, or event that involved leakage of water, and not a spike in the water consumed per day.

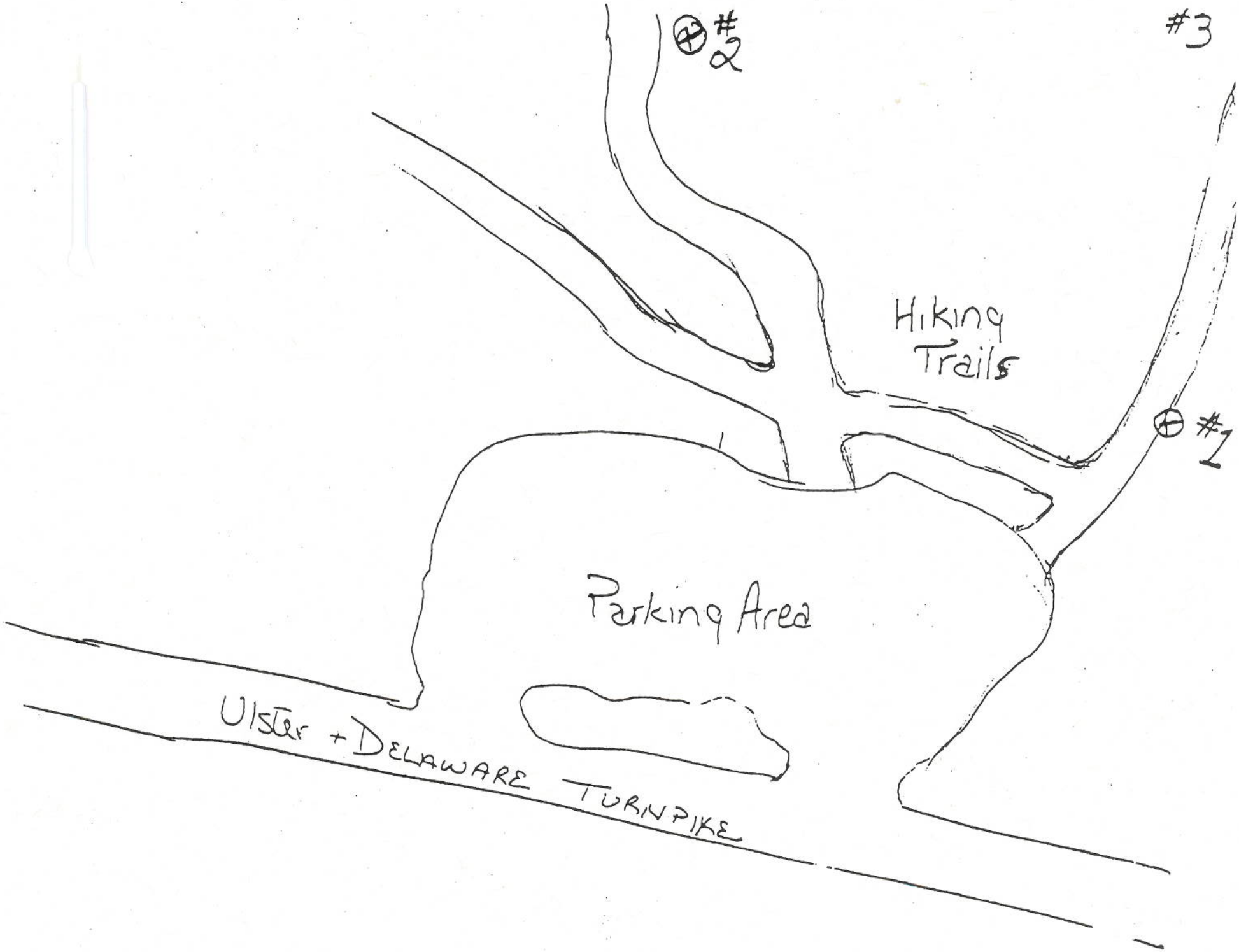
In light of the 5③ nominal and 1③ absolute filters that are installed in each building, and though the chlorine contact time will not always be at the desired 30 minute level, it is obvious that the vast number of days that ski center is in operation (apart from the leak that was in the water system connected to the Upper Lodge in the 2001-2002 season, where measured flows were much greater than usual) the desired contact time will be met. Since these conditions exist for this season, it is anticipated that the free chlorine residual will need to be set between 0.750 ppm and 1.000 ppm to ensure removal of all pontential contaminants to the system.

The Nursery Building, Garage, Carpenter's Shop will all continue on bottled water for the 2003 season.

Regarding the issue of the need of being able to provide makeup water to the lower tank, via delivery by tanker, the following option does exist. The facility has a flush hydrant by the reservoir that has been installed for makeup water from the lower tank to the upper reservoir, and could be reversed to transmit water from tankers to the lower tank via that connection.

SUMMARY

This system that is being constructed for Belleayre Mountain Ski Center is one that totally commits the Center to being a groundwater only facility. The systems that are being implemented with this project are ones that will ensure, along with proper operation, that the public and employees utilizing this facility will be well protected and provided with a safe water supply for consumption.


#3
#2
Hiking Trails
#1
Parking Area
Ulster + Delaware Turnpike

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

(1) County Ulster

Township

(3) DEC Well Number Pge 1 U2503

WELL COMPLETION REPORT

(4) OWNER Belleayre Ski NYS

(5) ADDRESS Well #1

(6) LOCATION OF WELL (See Instructions On Reverse) Show Lat/Long if available and method used: 42°05.09N 74°33.45W

☒ GPS ☐ DEC Website ☐ Map Interpolation

(7) DEPTH OF WELL BELOW LAND SURFACE (Feet) 348'

(8) DEPTH TO GROUNDWATER BELOW LAND SURFACE (Feet) DATE MEASURED 7/2/02

CASINGS

(9) DIAMETER 6 in. | in. | in. | in.

(10) LENGTH 50' ft. | ft. | ft. | in.

(11) GROUT TYPE / SEALING Bentonite

(12) GROUT / SEALING INTERVAL (Feet) FROM 0 TO 50

SCREENS

(13) MAKE & MATERIAL

(14) OPENINGS

(15) DIAMETER in. | in. | in. | in.

(16) LENGTH ft. | ft. | ft. | in.

DEPTH TO TOP OF SCREEN, FROM TOP OF CASING (Feet)

YIELD TEST

(18) DATE 7/2/02

(19) DURATION OF TEST

(20) LIFT METHOD ☐ Pump ☒ Air Lift ☐ Bail

(21) STABILIZED DISCHARGE (GPM) 60

(22) STATIC LEVEL PRIOR TO TEST (feet/inches below top of casing)

(23) MAXIMUM DRAWDOWN (Stabilized) (feet/inches below top of casing)

(24) RECOVERY (Time in hours/minutes)

(25) Was the water produced during test discharged away from immediate area? Yes ___ No ___

PUMP INSTALLATION

(26) PUMP INSTALLED? YES ___ NO X

(27) DATE

(28) PUMP INSTALLER

(29) TYPE

(30) MAKE

(31) MODEL

(32) MAXIMUM CAPACITY (GPM)

(33) PUMP INSTALLATION LEVEL FROM TOP OF CASING (Feet)

(34) METHOD OF DRILLING ☐ Rotary ☐ Cable Tool ☒ Other Dr Hammer

(36) USE OF WATER (see instructions for choices)

(36) DATE DRILLING WORK STARTED

(37) DATE DRILLING WORK COMPLETED

(38) DATE REPORT FILED 9/11/02

(39) DRILLER & COMPANY Titan Drilling

(40) DEC REGISTRATION NO. 10178

* Show log of geologic materials encountered with depth below ground surface, water bearing beds and water levels in each; casings; screens; pump; additional pumping tests and other matters of interest, e.g., water quality (sulphur, salt, methane). Describe repair work. Attach separate sheet if necessary.

See further instructions titled "Instructions for New York State Well Completion Report".

LOG *

Ground Surface EL. _____ ft. above sea level

Top Of Casing is located 1.5+ ft. above (+) or below (-) ground surface

TOP OF WELL

0-37	Hardpan Gravel
37-67	Brown Sandstone
67-82	red Sandstone
82-90	brown Sandstone
90-110	red Sandstone
110-116	red Shale
116-130	red Sandstone
130-140	Blue Sandstone
140-147	red Shale
147-158	red Sandstone
158-221	Blue Sandstone
221-228	Green Sandstone
228-230	Void
230-233	red Shale
233-252	red Sandstone
252-257	red Shale
257-270	red Sandstone
270-295	Blue Sandstone

BOTTOM OF HOLE

DRILLER COPY

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

(1) County Ulster

Township _____

Page 2

(3) DEC Well Number 02503

WELL COMPLETION REPORT

(4) OWNER Belleayre Ski NYS

(5) ADDRESS well #1

(6) LOCATION OF WELL (See Instructions On Reverse)
Show Lat/Long if available
and method used:
☐ GPS ☐ DEC Website ☐ Map Interpolation

(7) DEPTH OF WELL BELOW LAND SURFACE (Feet)

(8) DEPTH TO GROUNDWATER BELOW LAND SURFACE (Feet) DATE MEASURED

CASING

(9) DIAMETER
in. | in. | in. | in.

(10) LENGTH
ft. | ft. | ft. | in.

(11) GROUT TYPE / SEALING

(12) GROUT / SEALING INTERVAL (Feet) FROM _____ TO _____

SCREEN

(13) MAKE & MATERIAL

(14) OPENINGS

(15) DIAMETER
in. | in. | in. | in.

(16) LENGTH
ft. | ft. | ft. | in.

DEPTH TO TOP OF SCREEN, FROM TOP OF CASING (Feet)

TEST DATA

(18) DATE

(19) DURATION OF TEST

(20) LIFT METHOD ☐ Pump ☐ Air Lift ☐ Bail

(21) STABILIZED DISCHARGE (GPM)

(22) STATIC LEVEL PRIOR TO TEST (feet/inches below top of casing)

(23) MAXIMUM DRAWDOWN (Stabilized) (feet/inches below top of casing)

(24) RECOVERY (Time in hours/minutes)

(25) Was the water produced during test discharged away from immediate area? Yes ____ No ____

PUMP INSTALLATION

(26) PUMP INSTALLED? YES ___ NO ___

(27) DATE

(28) PUMP INSTALLER

(29) TYPE

(30) MAKE

(31) MODEL

(32) MAXIMUM CAPACITY (GPM)

(33) PUMP INSTALLATION LEVEL FROM TOP OF CASING (Feet)

(34) METHOD OF DRILLING
☐ Rotary ☐ Cable Tool ☐ Other _____

(35) USE OF WATER (see instructions for choices)

(36) DATE DRILLING WORK STARTED

(37) DATE DRILLING WORK COMPLETED

(38) DATE REPORT FILED

(39) DRILLER & COMPANY

(40) DEC REGISTRATION NO.

Show log of geologic materials encountered with depth below ground surface, water bearing beds and water levels in each; casings; screens; pump; additional pumping tests and other matters of interest, e.g., water quality (sulphur, salt, methane). Describe repair work. Attach separate sheet if necessary.

See further instructions titled "Instructions for New York State Well Completion Report".

LOG *

Ground Surface EL. _____ ft. above sea level

Top Of Casing is located _____ ft. above (+) or below (-) ground surface

TOP OF WELL	
295-326	Red Sandstone
326-328	void
328-341	Blue Sandstone
341-343	void
343-348	Blue Sandstone

BOTTOM OF HOLE

DRILLER COPY

Titan Drilling Corp. TEST PUMP DATA

2nd Test

DATE	7/31/02		JOB	well #1				
PUMP SETTING			PUMP MODEL					
TIME	GPM	STATIC	TIME	GPM	STATIC	TIME	GPM	STATIC
8:24	60	75.3	4:00	30	382.8			
8:35	60	89.4	5:00	30	383.5			
8:36	60	95.9	6:00	30	384.1			
8:37	60	101.4	7:00	30	386.8			
8:38	60	106.1	8:00	30	387.7			
8:39	60	113.7	9:00	30	389.6			
8:40	60	122.7	10:00	20	333.5			
8:41	51	130.2	11:00	20	227			
8:42	51	137.4	12:00	20	201.8			
8:43	51	144	1:00	20	198.5			
8:44	51	150.2	1:40		181			
8:45	51	155.9	1:41		172.1			
8:55	45	204.9	1:42		161.2			
9:15	45	255.7	1:43		151.4			
9:30	39	272.6	1:44		143.7			
9:45	36	283.8	1:45		137.2			
10:00	36	292.3	1:46		131.4			
10:30	36	306.3	1:47		127			
11:00	36	314.7	1:48		123.7			
12:00	32	328.3	1:49		121.2			
1:00	32	336	1:50		119.5			
2:00	32	343.1	2:00		114.8			
3:00	30	350	2:10		112.1			
4:00	30	353.2	2:25		110.2			
5:00	30	355.5	2:40		109.1			
6:00	30	361.7	2:55		107.7			
7:00	30	405.9	3:25		105.6			
8:00	30	368	3:55		104.4			
9:00	30	370	4:55		102.2			
10:00	30	372	5:55		100.5			
11:00	30	375	6:55		98.2			
12:00	30	375.8						
1:00	30	376.1						
2:00	30	379.4						
3:00	30	380.3						

Titan Drilling Corp. TEST PUMP DATA

2nd Test

DATE	7/31/2002		JOB	END TRAIL Well #3				
PUMP SETTING			PUMP MODEL					
TIME	GPM	STATIC	TIME	GPM	STATIC	TIME	GPM	STATIC
7:57		70						
10:08		70						
12:10		70.1						
2:10		70.1						
4:08		71.1						
6:05		71						
8:15		71						
10:20		71						
12:00		71						
1:00		71.1						
4:00		71.8						
7:00		71.8						
8:08		71.1						
10:39		71.1						
12:07		71.1						

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

(1) County Ulster

Township

(3) DEC Well Number pg 1 U2502

WELL COMPLETION REPORT

(4) OWNER Belleayre Ski N4S

(5) ADDRESS Well #2

(6) LOCATION OF WELL (See Instructions On Reverse) Show Lat/Long if available and method used: 42°08.64N 74°29.73W

☒ GPS ☐ DEC Website ☐ Map Interpolation

(7) DEPTH OF WELL BELOW LAND SURFACE (Feet) 497'

(8) DEPTH TO GROUNDWATER BELOW LAND SURFACE (Feet) DATE MEASURED

CASINGS

(9) DIAMETER 6' in. | in. | in. | in.

(10) LENGTH 110' ft. | ft. | ft. | in.

(11) GROUT TYPE / SEALING Bentonite

(12) GROUT / SEALING INTERVAL (Feet) FROM 0 TO 110

SCREENS

(13) MAKE & MATERIAL

(14) OPENINGS

(15) DIAMETER in. | in. | in. | in.

(16) LENGTH ft. | ft. | ft. | in.

DEPTH TO TOP OF SCREEN, FROM TOP OF CASING (Feet)

FIELD TEST

(18) DATE 7/1/02

(19) DURATION OF TEST

(20) LIFT METHOD ☐ Pump ☒ Air Lift ☐ Bail

(21) STABILIZED DISCHARGE (GPM) 18

(22) STATIC LEVEL PRIOR TO TEST (feet/inches below top of casing)

(23) MAXIMUM DRAWDOWN (Stabilized) (feet/inches below top of casing)

(24) RECOVERY (Time in hours/minutes)

(25) Was the water produced during test discharged away from immediate area? Yes ___ No ___

PUMP INSTALLATION

(26) PUMP INSTALLED? YES ___ NO X

(27) DATE

(28) PUMP INSTALLER

(29) TYPE

(30) MAKE

(31) MODEL

(32) MAXIMUM CAPACITY (GPM)

(33) PUMP INSTALLATION LEVEL FROM TOP OF CASING (Feet)

(34) METHOD OF DRILLING ☐ Rotary ☐ Cable Tool ☒ Other Air hammer

(35) USE OF WATER (see instructions for choices) Domestic

(36) DATE DRILLING WORK STARTED 6/28/02

(37) DATE DRILLING WORK COMPLETED 7/1/02

(38) DATE REPORT FILED 9/19/02

(39) DRILLER & COMPANY Tobin Drilling

(40) DEC REGISTRATION NO. 10178

LOG *

Ground Surface EL. _____ ft. above sea level

Top Of Casing is located 1.5t ft. above (+) or below (-) ground surface

TOP OF WELL

0-23	Hardpan Clay
23-101	Hardpan gravel
101-162	Blue Sandstone
162-165	red Shale
165-189	Blue Sandstone
189-203	red Sandstone
203-206	Blue Sandstone
206-230	red Sandstone
230-250	Blue Sandstone
250-282	red Sandstone
282-325	Blue Sandstone
325-342	red Shale
342-386	Blue Sandstone
386-414	red Shale
414-445	red Sandstone
445-452	red Shale
452-469	red Sandstone
469-484	Blue Sandstone
484-495	red Sandstone

BOTTOM OF HOLE

* Show log of geologic materials encountered with depth below ground surface, water bearing beds and water levels in each; casings; screens; pump; additional pumping tests and other matters of interest, e.g., water quality (sulphur, salt, methane). Describe repair work. Attach separate sheet if necessary.

See further instructions titled "Instructions for New York State Well Completion Report"

DRILLER COPY

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

(1) County _____

Township _____

Page 2

(3) DEC Well Number 122502

WELL COMPLETION REPORT

(4) OWNER Belleayre Ski

(5) ADDRESS Well #2

(6) LOCATION OF WELL (See Instructions On Reverse)
Show Lat/Long if available
and method used:
☐ GPS ☐ DEC Website ☐ Map Interpolation

(7) DEPTH OF WELL BELOW LAND SURFACE (Feet)

(8) DEPTH TO GROUNDWATER BELOW LAND SURFACE (Feet) DATE MEASURED

CASINGS

(9) DIAMETER in. | in. | in. | in.

(10) LENGTH ft. | ft. | ft. | in.

(11) GROUT TYPE / SEALING

(12) GROUT / SEALING INTERVAL (Feet) FROM _____ TO _____

SCREENS

(13) MAKE & MATERIAL

(14) OPENINGS

(15) DIAMETER in. | in. | in. | in.

(16) LENGTH ft. | ft. | ft. | in.

DEPTH TO TOP OF SCREEN, FROM TOP OF CASING (Feet)

YIELD TEST

(18) DATE

(19) DURATION OF TEST

(20) LIFT METHOD ☐ Pump ☐ Air Lift ☐ Bail

(21) STABILIZED DISCHARGE (GPM)

(22) STATIC LEVEL PRIOR TO TEST (feet/inches below top of casing)

(23) MAXIMUM DRAWDOWN (Stabilized) (feet/inches below top of casing)

(24) RECOVERY (Time in hours/minutes)

(25) Was the water produced during test discharged away from immediate area? Yes ___ No ___

PUMP INSTALLATION

(26) PUMP INSTALLED? YES ___ NO ___

(27) DATE

(28) PUMP INSTALLER

(29) TYPE

(30) MAKE

(31) MODEL

(32) MAXIMUM CAPACITY (GPM)

(33) PUMP INSTALLATION LEVEL FROM TOP OF CASING (Feet)

(34) METHOD OF DRILLING
☐ Rotary ☐ Cable Tool ☐ Other _____

(35) USE OF WATER (see instructions for choices)

(36) DATE DRILLING WORK STARTED

(37) DATE DRILLING WORK COMPLETED

(38) DATE REPORT FILED

(39) DRILLER & COMPANY [illegible]

(40) DEC REGISTRATION NO. 112178

Show log of geologic materials encountered with depth below ground surface, water bearing beds and water levels in each; casings; screens; pump; additional pumping tests and other matters of interest, e.g., water quality (sulphur, salt, methane). Describe repair work. Attach separate sheet if necessary.

See further instructions titled "Instructions for New York State Well Completion Report".

LOG *

Ground Surface EL. _____ ft. above sea level

Top Of Casing is located _____ ft.above (+) or below (-) ground surface

TOP OF WELL

495-497	Blue Sandstone

BOTTOM OF HOLE

DRILLER COPY

Titan Drilling Corp. TEST PUMP DATA

DATE			JOB	BELLEAYRE #2				
UMP SETTING		330	PUMP MODEL					
TIME	GPM	STATIC	TIME	GPM	STATIC	TIME	GPM	STATIC
8 14		130.8	1:00	75	238.3			
8 15	100	140	2:00	75	238.7			
8 16	100	156.2	3:00	75	239			
8 17	100	158	4:00	75	239.1			
8 18	100	159.2	5:00	75	239.2			
8 19	100	160.1	6:00	75	239.3			
8 20	75	162.15	7:00	75	239.6			
8 21	75	162.15	8:00	75	239.8			
8 22	75	165.8						
8 23	75	167.8	8:30		231.7			
8 24	75	169.7	8:31		230.1			
8 25	75	171.35	8:32		221.1			
8 30	75	178.4	8:33		219.8			
8 35	75	184.2	8:34		218.8			
8 40	75	187.1	8:35		217.8			
8 45	75	190.09	8:36		217			
9 00	75	197.3	8:37		216.3			
9 15	75	202.2	8:38		215.4			
9 30	75	205.33	8:39		214.4			
10 00	75	210.15	8:40		213.2			
10 30	75	213.9	8:45		208.75			
11 00	75	216.6	9:00		195.75			
12 00	75	221.13	9:15		188.7			
1 00	75	224	9:30		184.3			
2 00	75	226.43	9:45		181.3			
3 00	75	228.25	10:00		178.8			
4 00	75	229.85	10:30		174.8			
5 00	75	230.95	11:00		172			
6 00	75	232.6	11:30		169.4			
7 00	75	233.3	12:30		165.5			
8 00	75	234.4	1:30		162.4			
9 00	75	235.2	2:30		159.85			
10 00	75	236	3:30		157.3			
11 00	75	236.6						
12:00	75	237.9						

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

(1) County Ulster

Township

(3) DEC Well Number Page 1 U2509

WELL COMPLETION REPORT

(5) OWNER Belleayre Ski NYS

(6) ADDRESS Well # 3

(6) LOCATION OF WELL (See Instructions On Reverse) Show Lat/Long if available and method used: 42° 08.55N 74° 29.92W

☒ GPS ☐ DEC Website ☐ Map Interpolation

(7) DEPTH OF WELL BELOW LAND SURFACE (Feet) 498

(8) DEPTH TO GROUNDWATER BELOW LAND SURFACE (Feet) DATE MEASURED

CASINGS

(9) DIAMETER 6 in. | in. | in. | in.

(10) LENGTH 40 ft. | ft. | ft. | in.

(11) GROUT TYPE / SEALING Bentonite

(12) GROUT / SEALING INTERVAL (Feet) FROM 0 TO 40

SCREENS

(13) MAKE & MATERIAL

(14) OPENINGS

(15) DIAMETER in. | in. | in. | in.

(16) LENGTH ft. | ft. | ft. | in.

DEPTH TO TOP OF SCREEN, FROM TOP OF CASING (Feet)

YIELD TEST

(18) DATE 7/5/02

(19) DURATION OF TEST

(20) LIFT METHOD ☐ Pump ☒ Air Lift ☐ Bail

(21) STABILIZED DISCHARGE (GPM) 4.5

(22) STATIC LEVEL PRIOR TO TEST (feet/inches below top of casing)

(23) MAXIMUM DRAWDOWN (Stabilized) (feet/inches below top of casing)

(24) RECOVERY (Time in hours/minutes)

(25) Was the water produced during test discharged away from immediate area? Yes ___ No ___

PUMP INSTALLATION

(26) PUMP INSTALLED? YES ___ NO X

(27) DATE

(28) PUMP INSTALLER

(29) TYPE

(30) MAKE

(31) MODEL

(32) MAXIMUM CAPACITY (GPM)

(33) PUMP INSTALLATION LEVEL FROM TOP OF CASING (Feet)

(34) METHOD OF DRILLING ☐ Rotary ☐ Cable Tool ☒ Other Air hammer

(35) USE OF WATER (see instructions for choices) Domestic

(36) DATE DRILLING WORK STARTED 7/3/02

(37) DATE DRILLING WORK COMPLETED 7/5/02

(38) DATE REPORT FILED 9/19/02

(39) DRILLER & COMPANY Tetem Drilling

(40) DEC REGISTRATION NO. 10178

Show log of geologic materials encountered with depth below ground surface, water bearing beds and water levels in each; casings; screens; pump; additional pumping tests and other matters of interest, e.g., water quality (sulphur, salt, methane). Describe repair work. Attach separate sheet if necessary.

See further instructions titled "Instructions for New York State Well Completion Report".

LOG *

Ground Surface EL. _____ ft. above sea level

Top Of Casing is located 1.5+ ft. above (+) or below (-) ground surface

TOP OF WELL

0-26	Sand, gravel, clay
26-45	red Sandstone
45-48	Brown Sandstone
48-65	red Sandstone
65-69	Brown Sandstone
69-78	Blue Sandstone
78-87	Brown Sandstone
87-92	red Sandstone
92-103	Blue Sandstone
103-117	green Sandstone
117-127	red shale
127-139	red Sandstone
139-150	Blue Sandstone
150-156	red Shale
156-168	red Sandstone
168-176	Blue Sandstone
176-180	red Sandstone

BOTTOM OF HOLE

DRILLER COPY

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Page 2

(1) County Ulster

Township _____

(3) DEC Well Number U2509

WELL COMPLETION REPORT

(4) OWNER Billeagre Ski NYS

(5) ADDRESS well #3

(6) LOCATION OF WELL (See Instructions On Reverse)
Show Lat/Long if available and method used:
☐ GPS ☐ DEC Website ☐ Map Interpolation

(7) DEPTH OF WELL BELOW LAND SURFACE (Feet)

(8) DEPTH TO GROUNDWATER BELOW LAND SURFACE (Feet) DATE MEASURED

CASINGS

(9) DIAMETER in. | in. | in. | in.

(10) LENGTH ft. | ft. | ft. | in.

(11) GROUT TYPE / SEALING

(12) GROUT / SEALING INTERVAL (Feet) FROM _____ TO _____

SCREENS

(13) MAKE & MATERIAL

(14) OPENINGS

(15) DIAMETER in. | in. | in. | in.

(16) LENGTH ft. | ft. | ft. | in.

(17) DEPTH TO TOP OF SCREEN, FROM TOP OF CASING (Feet)

YIELD TEST

(18) DATE

(19) DURATION OF TEST

(20) LIFT METHOD ☐ Pump ☐ Air Lift ☐ Bail

(21) STABILIZED DISCHARGE (GPM)

(22) STATIC LEVEL PRIOR TO TEST (feet/inches below top of casing)

(23) MAXIMUM DRAWDOWN (Stabilized) (feet/inches below top of casing)

(24) RECOVERY (Time in hours/minutes)

(25) Was the water produced during test discharged away from immediate area? Yes ___ No ___

PUMP INSTALLATION

(26) PUMP INSTALLED? YES ___ NO ___

(27) DATE

(28) PUMP INSTALLER

(29) TYPE

(30) MAKE

(31) MODEL

(32) MAXIMUM CAPACITY (GPM)

(33) PUMP INSTALLATION LEVEL FROM TOP OF CASING (Feet)

(34) METHOD OF DRILLING
☐ Rotary ☐ Cable Tool ☐ Other _____

(35) USE OF WATER (see instructions for choices)

(36) DATE DRILLING WORK STARTED

(37) DATE DRILLING WORK COMPLETED

(38) DATE REPORT FILED

(39) DRILLER & COMPANY

(40) DEC REGISTRATION NO.

LOG *

Ground Surface EL. _____ ft. above sea level

Top Of Casing is located _____ ft.above (+) or below (-) ground surface

TOP OF WELL

180-214	Blue Sandstone
214-223	red Sandstone
223-231	Blue Sandstone
231-243	red Sandstone
243-253	Blue Sandstone
253-256	red Sandstone
256-281	Blue Sandstone
281-304	red Sandstone
304-320	Blue Sandstone
320-337	red Sandstone
337-356	Blue Shale
356-391	Blue Sandstone
391-399	red Sandstone
399-418	red Shale
418-424	Blue Shale
424-458	Blue Sandstone
458-468	red Sandstone
468-493	red Shale
493-498	red Sandstone

BOTTOM OF HOLE

* Show log of geologic materials encountered with depth below ground surface, water bearing beds and water levels in each; casings; screens; pump; additional pumping tests and other matters of interest, e.g., water quality (sulphur, salt, methane). Describe repair work. Attach separate sheet if necessary.

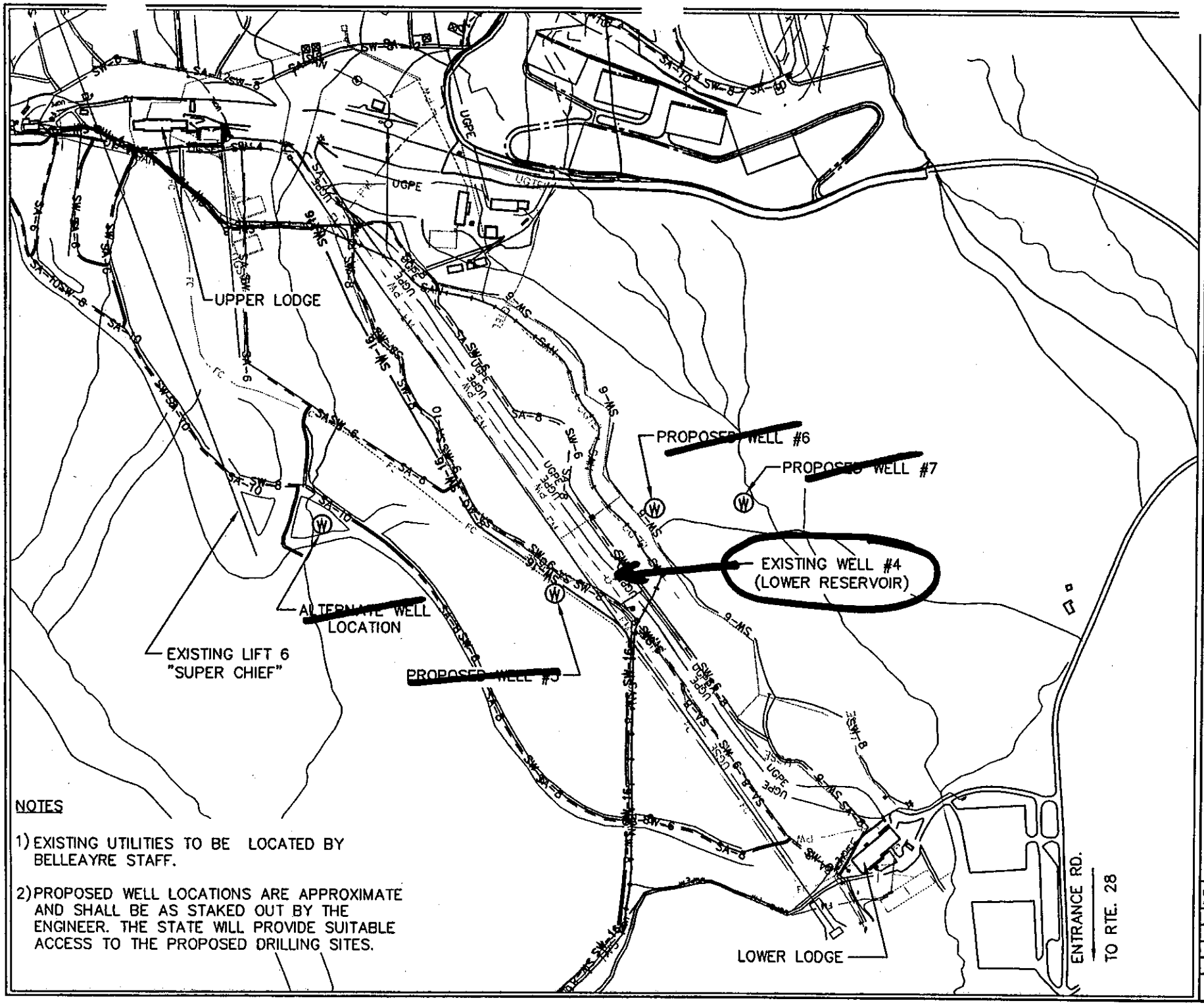
See further instructions titled "Instructions for New York State Well Completion Report".

DRILLER COPY

Titan Drilling Corp. TEST PUMP DATA

1st Test Hydrofrac'd well

DATE			JOB	WELL #3				
JMP SETTING			PUMP MODEL					
TIME	GPM	STATIC	TIME	GPM	STATIC	TIME	GPM	STATIC
7:30		66.5	2:00	18	437.8			
8 05		85	3:00	18	439.2			
8 06	50	98	4:00	18	440.7			
8:07	50	108	5:00	18	443.4			
8:08	50	120.4	6:00	18	448.9			
8 09	50	132.3	7:00	18	445.1			
8 10	50	144	8:00	18	4:45			
8 11	50	156	8:01		436			
8 12	49	169.8	8:02		4:29			
8 13	49	181.1	8:03		419.5			
8:14	47	193	8:04		409.5			
8:15	44	205.3	8:05		400			
8:20	42	257.9	8:06		391			
8 25	38	318.3	8:07		381.6			
8 30	36	364.9	8:08		372.2			
8 45	30	426.35	8:09		363.2			
8 52	24	440.6	8:10		354			
9 00	24	442	8:15		265.5			
9 30	24	440.9	8:20		228			
10 00	18	442.8	8:25		177			
11 00	18	444	8:30		145.3			
12 00	18	437	8:35		119.9			
1:00	18	437	8:40		103			
2 00	18	437	8:55		86.4			
3.00	18	437	9:15		79.9			
4 00	18	439.2	9:30		78			
5:00	18	440.7	10:00		76.1			
6.00	18	428.6	11:00		74.1			
7.00	18	428	12:00		73.4			
8:00	18	428.2	1:00		72.8			
9:00	18	431.3	2:00		72.4			
10.00	18	434						
11 00	18	435.5						
12.00	18	435.8						
1:00	18	437.5						



NOTES

1) EXISTING UTILITIES TO BE LOCATED BY BELLEAYRE STAFF.

2) PROPOSED WELL LOCATIONS ARE APPROXIMATE AND SHALL BE AS STAKED OUT BY THE ENGINEER. THE STATE WILL PROVIDE SUITABLE ACCESS TO THE PROPOSED DRILLING SITES.

STATE OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF OPERATIONS
BUREAU OF DESIGN & CONSTRUCTION

DESIGNED BY ___ CHECKED BY ___ DRAWN BY ___

REVISIONS

NO.	DATE	DESCRIPTION	BY
		AS BUILT	

PROJECT DESCRIPTION

BELLEAYRE MTN. SKI AREA
WELL DRILLING

SITE PLAN

FACILITY NAME	BELLEAYRE MTN. SKI AREA
FACILITY NO.	0073
PROJECT NO.	02-2236
DATE	FEB., 2002
SCALE	AS NOTED
DRAWING NO.	2

Titan
DRILLING CORP. ARKVILLE N. Y. 12406 PHONE 914-586-4000

WELL LOG

DEPT. OF ENVIROMENTAL CONSERVATION
BELLAEYRE SKI CENTER
6" WELL

LOWER LODGE
WELL # 4

6/16/92

0- 25	HARDPAN
25- 70	BLUE SANDSTONE
70- 72	BROWN SANDSTONE
72- 82	BLUE SANDSTONE
82- 87	RED SHALE
87- 99	RED SANDSTONE
99-175	BLUE SANDSTONE
175-195	RED SHALE
195-210	RED SANDSTONE
210-376	BLUE SANDSTONE
376-387	RED SANDSTONE
387-410	BLUE SANDSTONE
410-456	RED SANDSTONE
456-540	BLUE SANDSTONE
540-598	RED SANDSTONE

TOTAL DRILLING; 598 FT
TOTAL CASING; 40 FT
DRIVE SHOE
YIELD; ~~24~~ GPM

20+ GPM agn

Titan DRILLING CORP. ARKVILLE N. Y. 12406 PHONE 914-586-4000

BELLEAYRE SKI CENTER

DATE: 6/18/92 JOB: WELL #4 DATE: _____

PUMP: _____ PUMP SETTING: _____

	TIME	GPM	STATIC LEVEL		TIME	GPM	STATIC LEVEL
0	10:42	36	296'	0	4:30	36	329'
8	10:50	36	320'	24	5:00	36	329'
10	11:00	36	329'	33	5:30	36	329'
20	11:10	36	330'	34	6:00	36	329'
30	11:20	36	330'	34	6:30	36	329'
40	11:30	36	330'	34	7:00	36	329'
50	11:40	36	329'	33	7:30	36	329'
60	11:50	36	329'		8:00	36	329'
70	12:00	36	329'		8:30	36	329'
	12:15	36	329'		9:00	36	329'
	12:30	36	329'		9:30	36	329'
	12:45	36	329'		10:00	36	329'
	1:00	36	329'		10:30	36	329'
	1:15	36	329'		11:00	36	329'
	1:30	36	329'		11:30	36	329'
	1:45	36	329'		a:m12:00	36	329'
	2:00	36	329'		12:30	36	329'
	2:30	36	329'		1:00	36	329'
	3:00	36	329'		1:30	36	329'
	3:30	36	329'		2:00	36	329'
	4:00	36	329'		2:30	36	329'

Titan DRILLING CORP. ARKVILLE N. Y. 12406 PHONE 914-586-4000

CONT'D

DATE: 6/18/92 JOB Well#4 DATE: _____

PUMP: _____ PUMP SETTING: _____

	TIME	GPM	STATIC LEVEL	TIME	GPM	STATIC LEVEL
	3:00	36	329'	11:07		316'
	3:30	36	329'	11:18		316'
	4:00	36	329'	11:30		316'
	4:30	36	329'			
	5:00	36	329'			
	5:30	36	329'			
	6:00	36	329'			
	6:30	36	329'			
	7:00	36	329'			
	7:30	36	329'			
	8:00	36	329'			
	8:30	36	329'			
	9:00	36	329'			
	9:30	36	329'			
	10:00	36	329'			
	10:30	36	329'			
Stop Test Pump	10:42	36	329'			
	10:47		318'			
	10:52		317'			
	10:57		317'			
	11:02		317'			