

# MEMORANDUM

**Date:** April 4, 2012  
**To:** Water Right File 96-9012  
**From:** medl  
**Re:** license review

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This permit authorizes a system of water uses which were developed at the Sagle, Idaho headquarters of Northern Lights, Inc. an electric cooperative.

## **Applicant**

Northern Lights Inc., is registered with IDSOS as #C19095. Available Bonner County taxlot information confirms that NLI owns the property which contains both the POD and POU.

My primary contact was system operator, Mr. Rod Babcock (Purchasing Agent, Northern Lights Inc.)

## **Source & Point of Diversion**

The source of the water is a well located within the property. The well location has not yet been GPSd. I shared the pertinent contents of the water right file with IDWR state office groundwater protection personnel. M. Anders created the well layer shape based on the documents I provided. The POD selected for this right is the well shape that he created.

## **System Description**

The source well is fitted with a 20 HP Goulds submersible pump model #7WAHC. The IDWR field examiner found it operating at 200 gpm. The pump curve shows 280 gpm as the most efficient operating point. This pump fills a 150,000 gallon, below-grade reservoir that temporarily stores all the water used on the complex.

That reservoir is tapped by 3 pumps. Two pumps serve the distribution system. One high capacity 60 HP pump serves the district fire protection system.

The design engineer (James A. Sewell & Associates) specified that the two, distribution system pumps be 10 HP Goulds pumps model #6CLC010. On April 10, 2000, Panhandle Health District (PHD) personnel found two, 15 HP pumps. The PHD inspector and the NLI system operator stated that 150 gpm (0.33 cfs) is the pumping rate. Pump curves downloaded from the Goulds website show a 15 HP option for this model.

These two pumps alternate relaying water from the reservoir to twelve, 119 gal pressure tanks which float or ride on the system. Floating on the water line or system means that the pumps operate at a uniform rate, with the storage either making up or absorbing the difference between the discharge and the demand. The two pumps supply the entire commercial, domestic, irrigation and heating/cooling uses and their rate is the maximum rate for each of those uses.

The examiner recommended rates based on the well pump capacity but only fire protection would ultimately be limited by the capacity of that pump.

## **Water Use**

Beneficial use of water was confirmed by IDWR Northern Region personnel during the June 7, 2001 field exam, but the use was not unambiguously described by the Beneficial Use Field Report. Although the examiner based his recommendations on different system components than I do, both the examiner and I find more rate has been developed for some uses than was permitted.

This water system is also identified as PWS# ID1090243 and has been inspected by Panhandle Health

District. I requested and received copies of their inspection reports to supplement the Beneficial Use Field Report.

Proof of Beneficial Use statement was received in January 2001. I requested and received copies of monthly, pump usage logs for 2001. These water monitoring logs are maintained by NLI personnel. My analysis of the pumping records for 2001 show 87.7 AF of water was diverted by the domestic pumps. Refer to the spreadsheet: NLI Water Monitoring Data.

#### Fire Protection

A water right is not required to fight a fire. The examiner recommended fire protection rate equal to the well pump rate, 200 gpm (0.445 cfs). I agree in principle, but I believe that the rate the examiner saw was not typical. The usage logs provided by NLI indicate that the annual low occurred in June 2001. Those logs also show a totalized flow that would not be achievable at a constant 200 gpm. In addition PHD found the well pump operating at 300 gpm in 2008 and the best efficiency point for a Goulds model #7WAHC would be 280 gpm (0.62 cfs). I believe that this pump operates at higher rates than the examiner recommends.

The Northern Lights Inc., headquarters complex is outside of the Sagle Valley Water & Sewer District service territory. They are in a rural fire district and provide the fire protection storage to support four hydrants along Chevy Street, the street fronting this property. Fire district pumper trucks periodically fill from the hydrants. Those fill occurrences provide a secondary benefit for system by flushing the storage tank. The irregular use of the high capacity pump, which is seen on the monitoring records, represents those fills.

#### Space Heating/Cooling

The examiner recommends a combined use rate for heating and cooling uses but provides no information about the heating/cooling system. I requested heat system specs or design parameters from Northern Lights, Inc.

The same subsystem handles both the heating and cooling uses. A heat exchanger interfaces between the storage reservoir and 15 heat pumps to provide climate control for the office building only. The other buildings are heated by other means. The heat exchanger that was in place during the 2001 exam was incorrectly sized, used too much water, and has been replaced. No design information for that unit was available but NLI personnel stated that it should have been sized to operate at 115 gpm.

Specifications for the 15 installed heat pumps were available. The total design flow rate for the 15 heat pumps would be ~ 115.5 gpm (0.26 cfs) if the water temperature is 45 deg F. This designed or as-built rate exceeds the rate authorized by the permit for heating and cooling.

The design, combined, heat transfer rate of the 15 heat pumps totals 602.07 MBH or 602070 BTU/hr in heating mode. This is consistent with a brief estimate of the required heat transfer rate based only on the office building size. I used the total design rate in my calculation of the volume of water used for heating.

Climate data from Sandpoint Exp Stn, (Co-op #108137) a weather station near the POU, supports the idea that the bulk of the water developed under this permit would be used for heating. I calculated a space heating volume based on an adaptation of an ASHRAE method for estimating heat energy use. 2001 was not an unusually hot or cold year. However, even using the most extreme heating degree days (HDD) for the period of record, in the equation, I found it difficult to justify the volume of water that was used and reported to me by NLI. Only by reducing the efficiency several percent, could I achieve the volume of water shown on the pump records for 2001.

#### Irrigation

I found fewer total acres in irrigation than the examiner recommended. Some of the landscaping is natural and not irrigated. The tree line on the south border of the property is one of those natural areas.

#### Domestic-internal

The in house, domestic use is limited to the capacity of the on-site sewage system. According to Panhandle Health District records, the drainfields are limited to a total design flow of 1178 gpd. This converts to 0.002 cfs and 0.0043 AF/day. This rate is significantly less than the permitted rate of 0.76 cfs.

#### Domestic-external

The as-built facility plans show a truck wash area. The truck wash bay is located against the west side of the vehicle repair/warehouse building. NLI personnel confirmed that they put the area to its intended use. Approximately once a month, the fleet of trucks is washed. I assumed that a wash required 20 gal/vehicle, for each of the 45 trucks. The wash/rinse water does not appear to discharge to the on-site drain field. This is not a large water use and I am recommending minimum additional rate and volume for this use. The permit holders may wish to account for this use separately but that will require an amendment to the permit.

#### Rate and Volume Summary

The permitted rate for domestic use is much more than either the examiner or I recommend for this right. In contrast, both the examiner and I found heating and cooling rates which are higher than the sub-category rates authorized by the permit.

The total rate that has been developed is less than the total rate which was authorized by the permit. But there isn't any water available through an under-developed, consumptive use which can be swapped to cover the full rate which has been developed for the heating/cooling uses.

The total volume used in 2001 was likely achieved by pumping at rates in excess of the 200 gpm found by the examiner.

Please refer to the attached spreadsheet Nature of Use 96-9012 (Northern Lights Inc).

#### **Place of Use**

The examiner recommended 2 acres of irrigation somewhere in the NENW. He did not provide a map showing the irrigated areas that he found nor the PLSS address locations for any of the other uses. I created the place-of-use shapes based on available aerial photography and confirmed them with NLI personnel.

#### **Point of Discharge**

The consulting engineers who designed the Northern Lights Inc., Sagle headquarters applied for multiple injection well permits on behalf of their client but may not have developed them. I was not able to determine locations for all of them.

NLI personnel confirmed that the heating/cooling system discharges water to a drywell located in the property, east and north of the office building patio.

#### **Combined Use**

Two wells were drilled to serve this complex. Only one of them was productive. The other drew too much sand and had to be abandoned. Ground water protection records show an abandoned well near the production well.

The domestic, irrigation, and heating/cooling, systems are all supplied by the same two pumps which pump from a common reservoir. Although the piping design shows that the well can bypass the storage reservoir and directly serve the distribution system, NLI personnel have stated that that has never occurred.

POU overlap analysis found no overlapping water uses.

#### **Recommendations**

Please refer to the spreadsheet Nature of Use 96-9012 (Northern Lights Inc).

| Nature of Use 96-9012 (Northern Lights, Inc.) |                         |           |            |                                                                                                     |
|-----------------------------------------------|-------------------------|-----------|------------|-----------------------------------------------------------------------------------------------------|
|                                               | Irrigation Use (ac)     | rate(cfs) | volume(af) | comment                                                                                             |
| Permit                                        | 2                       | 0.06      |            |                                                                                                     |
| Exam                                          | 2                       | 0.06      | 6          |                                                                                                     |
| License                                       | 1.4                     | 0.04      | 4.2        | 3 AF/acre x 1.4 ac = 4.2 AF; 0.03 cfs/ac = 0.042 cfs                                                |
|                                               |                         | 0.02      | 1.8        | surplus cfs and volume                                                                              |
|                                               | Domestic Use            | rate(cfs) | volume(af) |                                                                                                     |
| Permit                                        | commercial facility     | 0.75      |            | commercial facility with 81 employees                                                               |
| Exam                                          | commercial facility     | 0.01      | 1          |                                                                                                     |
| License                                       | commercial facility     | 0.66      | 0.9        | limited to drain field cap 1178 gpd (~.0018 cfs); 0.003 AF/day x 261 days = 0.939                   |
|                                               |                         | 0.09      |            | undeveloped rate                                                                                    |
|                                               | Domestic (external) Use | rate(cfs) | volume(af) |                                                                                                     |
| Permit                                        |                         |           |            | 45 trucks washed once/month on same day                                                             |
| Exam                                          |                         |           |            | 20 gal/vehicle 20 minutes at 10 gpm                                                                 |
| License                                       |                         | 0.66      | 0.1        | requires 900 gal/day; 10800 gal/yr                                                                  |
|                                               |                         | 0.66      | 1          | truck wash bay not a permitted use 0.02 cfs and .03 AF actual                                       |
|                                               |                         |           |            | well pump exceeds domestic use capacity but permitted for 0.75 cfs                                  |
|                                               | Heating Use             | rate(cfs) | volume(af) |                                                                                                     |
| Permit                                        |                         | 0.22      |            |                                                                                                     |
| Exam                                          |                         | 0.45      | 114        |                                                                                                     |
| License                                       |                         | 0.22      | 79.3       | additional rate likely in use for H/C but the permit authorization limits to 0.22 cfs.              |
|                                               |                         | 0.04      |            | deficit cfs                                                                                         |
|                                               | Cooling Use             | rate(cfs) | volume(af) |                                                                                                     |
| Permit                                        |                         | 0.22      |            |                                                                                                     |
| Exam                                          |                         | 0.45      | 114        |                                                                                                     |
| License                                       |                         | 0.22      | 3.2        | additional rate likely in use for H/C but the permit limits to 0.22 cfs. 82.5 AF is combined volume |
|                                               |                         | 0.04      |            | deficit cfs at least 0.04 cfs = 0.26 cfs (design) - 0.22 cfs (permitted);                           |
|                                               | Fire Protection Use     | rate(cfs) | volume(af) |                                                                                                     |
| Permit                                        |                         | 3.34      |            |                                                                                                     |
| Exam                                          |                         | 0.45      |            | 0.66 cfs = 300 gpm witnessed by PHD personnel                                                       |
| License                                       |                         | 0.66      |            | 0.62 cfs = well pump curve shows 280 gpm as best efficiency point                                   |
|                                               | Combined Uses           | rate(cfs) | volume(af) |                                                                                                     |
| Permit                                        |                         | 4.37      |            |                                                                                                     |
| Exam                                          |                         | 0.45      | 121        |                                                                                                     |
| License                                       |                         | 0.66      | 87.7       |                                                                                                     |