



**MARION CROSS ELEMENTARY SCHOOL
NORWICH, VT
Septic System Inspection & Evaluation
May 5, 2009
CLD Consulting Engineers**

This report is the result of concerns expressed as to the proper operation and function of the existing septic system serving the Marion Cross School.

This system consists of two large concrete septic tanks in series, the first tank of 5000 gallons in size and the second at 4000 gallons in size, two pump chamber tanks, and four pressure dosed leaching fields. Pressure dosing pumps the liquid portion (effluent) of the wastewater into a pipe manifold and pipe lateral distribution system within each leaching field. The liquid is essentially sprayed out of perforated pipe laterals into the septic stone within the leach fields. This system pumps effluent into two of the four leach fields each year and in the spring of each year is switched from one series of two fields to the second series. The four leach fields are on the Marion Cross side of the Norwich Green.

CLD Consulting Engineers performed three inspections of this existing system between April 6, 2009 and April 28, 2009. In summary the leach fields are in good operating condition based on the series of inspections performed. None of the fields exhibited any signs of problem conditions. There were no signs that effluent was surcharged or had flooded the leach fields in the past. No organics were observed in the soil covering the fields, or on the fabric over the septic stone, or in the septic stone itself. Soil probes dug in those fields that were currently under operation showed no signs of any moisture or water ponding in the fields. The system was dosed while a probe hole was still open and effluent was heard spraying out of the pipe onto the septic stone nearest the open hole. No water was observed ponding in the stone exposed in this observation hole during the dosing period. Septic odor was only noted when the system was dosing. This is due to air escaping from the pipe network and exiting the system through the open observation hole. Once the system stopped dosing, the odor disappeared. Any ponding of effluent in the leach fields tends to promote an anaerobic condition which causes odors to remain for extended periods of time. This condition was not observed. A deep soil probe dug into the septic stone of one of the most recently operating fields indicated the septic stone to be at least 16 inches deep and no organics or odors were observed in the stone or soil at the bottom of the stone at the base of this hole.

The following is information associated with each inspection of this system:

- 1. The first inspection performed on April 6, 2009 was to observe the condition of the ground surface over the leach fields and to see if there**

were any signs of surcharging within the fields. Two soil probe holes were dug (spade holes) down into top of the leaching fields.

- A. The first hole was dug in approx. the middle of the leach field #1 (southerly most field) nearest the access drive to the school. Depth of soil cover was approx. 18-20 inches over the top of the septic stone. That cover consisted of about 8 inches of topsoil and 10-12 inches of sand over the fabric covering the septic stone. A portion of the fabric covering the stone was removed and the stone examined. The stone was very clean and had fairly significant void space between the stones. An auger was worked through the stone to examine the stone six to eight inches below the top of stone. All stone observed was dry and very clean. **No signs of organics or discoloration were observed in the stone. No moisture or effluent was present to the depth observed (approx. 8 inches into the stone).** This probe hole was filled in and the sod replaced.
- B. Hole #2 was dug in the what is probably leach field #3. Soil cover in this field was approx. 30 inches in depth. The surface was in the area of the green that has very limited grass cover and appears to be a heavy play area. The soil was loamy and fairly dense down to about 20 inches. Above the fabric was about 10 inches of a more granular soil. The fabric was removed and the septic stone examined below. The stone was very clean and similar to the condition of probe #1. Some of the stones were moist but no free water was observed. **There were no signs of any ponding past or present and no organic staining. No odors were observed in either hole 1 or 2.**

2. A second inspection was performed on April 17, 2009, the Friday before spring vacation.

- A. **A second series of soil probes were dug on this day. One probe hole per field, each one approximately in the middle of each particular leach field. None of these holes had any signs of ponding or surcharging of effluent or any indicators that these situations had occurred in the past.** The fabric covering the stone was clean with no organic staining. The stone down to an eight inch probe depth was clean, no moisture observed on the stone and no signs of any organic build-up or staining on the stone.
- B. **The pumps and pumping system were inspected and examined and the pumps were exercised.** Pump #1 was turned on and observed for its operation. A visual and audible inspection indicated no improper or mal functioning of the pump. Upon shutting down the first pump and calling for the pump to run a second time did indicate that the pumps properly switched to cycle the second pump. **This test**

indicated that the pumps do appear to be cycling properly. It was noted that the access **hatch** to the pump chamber **needs one of the hatch hinges replaced**, it is currently broken. **There should also be a means for securing the hatch cover in the open position**, currently it needs to be held open by an individual. The rail system (method for removing and pulling the pumps out of the pump chamber for servicing) is corroded and does not appear functional. **Removing a pump for service may be difficult with the aluminum rails corroded as they are. It is suggested that the guide rails be replaced with stainless steel rails.** Both pumps appear to be the original pumps installed when the system was built. It is also suggested that money be set aside for purchase of replacement pumps. **It may be wise to purchase a replacement pump and have it available in case either one of the pumps requires replacement.** The motor operation of these pumps can be checked by a pump technician to determine the condition of the pump motors.

- C. Upon operating the 1st pump, flow was heard in the pipe lateral that was exposed in one the probe hole in field #1. From this observation it was confirmed that the fields currently under operation were fields #1 and #2. Upon pumping, septic odor was observed in the probe holes of fields #1 and #2, not in fields #3 or #4. It is a normal condition to observe an odor when the system is pressure dosing a field. The pipe network in each field fills with air between pumping cycles and that air must vent for the effluent to fill and discharge out of the pipe system to dose the fields. **No signs of any effluent build-up were observed in fields #1 and #2 during the dosing cycle.**
- D. After all soil probe holes were inspected the valves were operated to change the flow of effluent to fields #3 and #4. This (Spring school vacation) is the normal annual time when the dosing is switched over from one series of two fields to the second series. **Resting half of the leaching system for a year and alternating the use of the fields is a good operating procedure for maintaining a long life to this system.** Observations of the venting of air out of the pipe network for fields #3 and #4 confirmed the change over in operation to these fields once the pumps were operated. Air in the pipes vented out through the open probe holes in fields #3 and #4.
- E. **All observations during inspection #1 and #2 indicated the system was operating properly with no signs past or present of surcharging of the fields.** There is an area of the ground surface that is primarily over field #3 but some onto the surface of field #4 where there is currently very little grass growing. This may be due to this area being a heavy traffic play area. We suggest that the topsoil in this

area be de-compacted by either tilling or aerating and the area be seeded with a high traffic grass seed to establish a good sod cover.

3. A third inspection of the system occurred on April 28, 2009.

An attempt was made to dig down into field #1 through the entire depth of the septic stone. A six inch diameter observation pipe was installed in this hole as a permanent observation port to examine the condition of the field over time. The septic stone depth was determined to be at least 18 inches deep at this location. The bottom at 18 inches had some soil mixed into the stone. This depth is close to the bottom of the septic stone. This was as deep as one could dig with the equipment at hand. Both the stone and the soil at this depth had minimal signs of any organics and no organic build-up was observed. The stone at this depth was relatively dry. This field had last operated within two weeks before this inspection date. Based on this inspection the system does appear to be draining properly away from the leach fields and there were no indicators that any past ponding had occurred.

In conclusion, this system is operating with no signs of any past or present ponding or surcharging of effluent in any of the fields. The septic stone is very clean and no organic staining or observed build-up of organics was observed in any of the probe hole inspections. Based on a daily peak flow of approximately 2500 gallons per day, just under one half inch of effluent is applied daily, during an operating school day, per square foot of leach field bottom surface area. This is based on only operating two fields at any one time, which is the current operating procedure. Two leach fields have a combined storage volume, based on the available void space between the stone and assuming 18 inches of stone depth, of approximately 28,300 gallons of effluent without any leaching occurring. There were no indicators found to suggest that leaching of effluent is restricted by any organic build-up and none of the storage volume in the septic stone appears to be taken up by ponded effluent.