

Pressure Transducer Installation

Section 1. Installation of Pressure Transducers

An important portion of the bioreactor project is to measure head on the leachate collection system (LCS) liner. This effort has been accomplished by placing pressure transducers on top of the LCS liner. A total of 128 transducers were used for the installation which were divided equally between the KPSI Series 700 and Druck Series 1230 pressure transducers. A team of researchers from UCF and UF carried out this installation from May 26 through May 31 in coordination with the Florida Center for Solid and Hazardous Waste Management (FCSHWM) and the New River Regional Landfill (NRRL) operator.

The transducers were installed in an area acceptable to both the landfill operator and the researchers. This area is in the southeast corner of Cell 2 as shown in Figure 1. A grid of 100 feet x 100 feet was marked at 128 locations over which the transducers were installed. A 3-D view of the installation locations is shown in Figure 2.

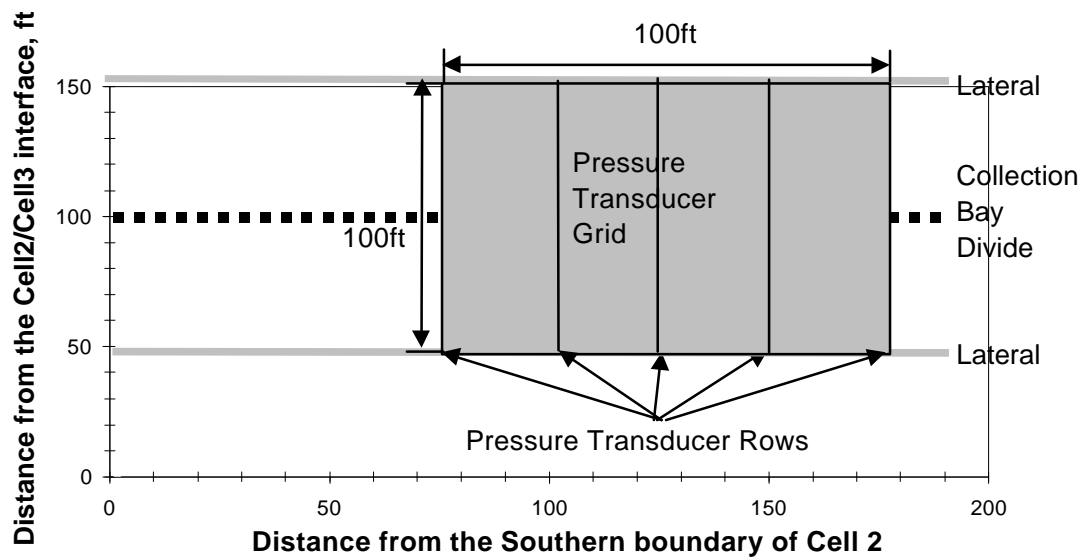


Figure 1. An areal view of the Pressure Transducer Grid

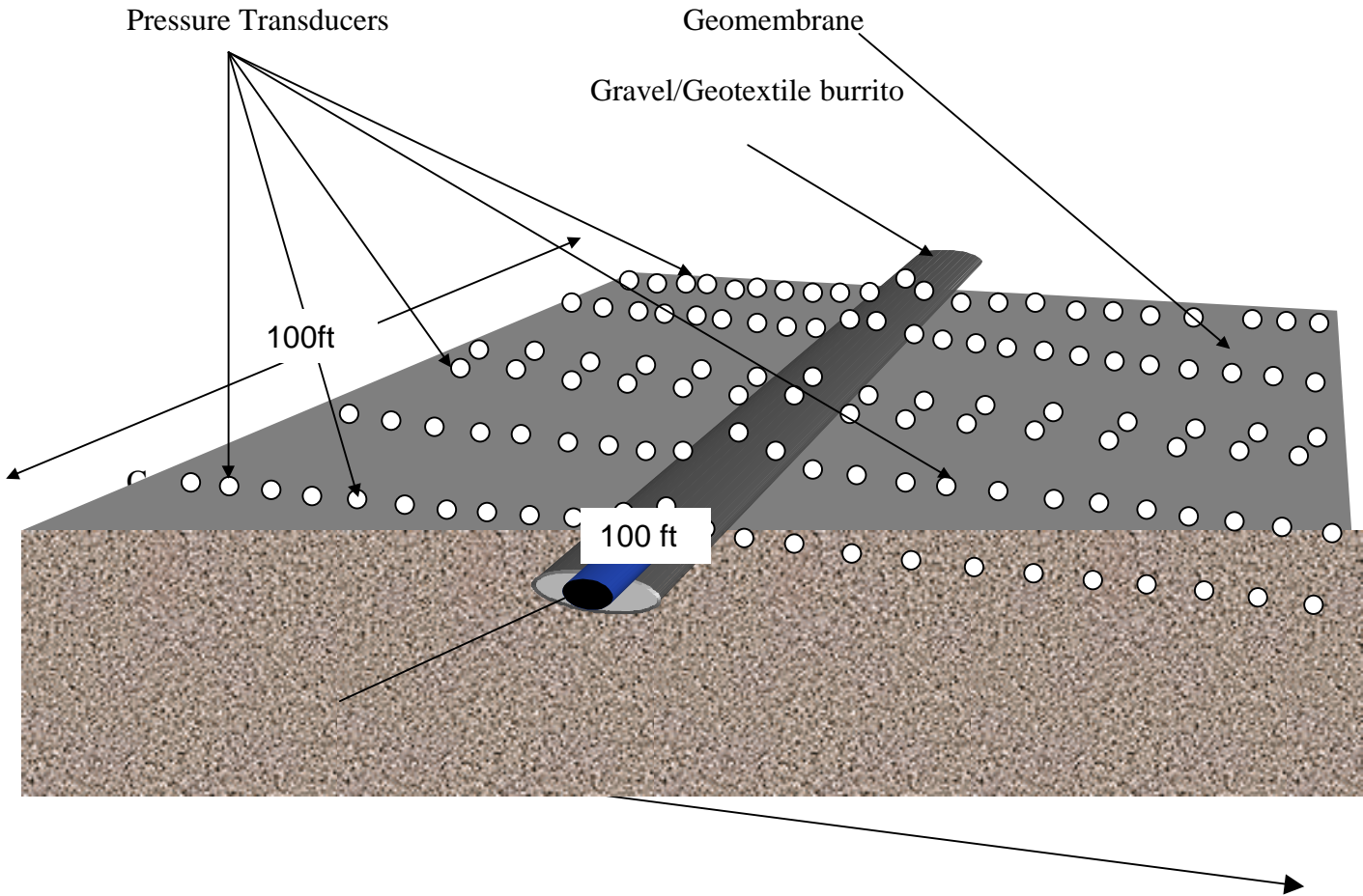


Figure 2. A 3-D view of the Pressure Transducer Installation locations.

The pressure transducers were installed in the following steps:

1. The researchers excavated through the 2 feet of LCS drainage material until the liner was reached. This excavation was done in two stages:
 - Approximately 1.5 feet of the drainage material was excavated using a shovel.
 - The remaining 8 inches of drainage material was excavated using either a garden shovel or a construction shovel with rubber blade guards. This was done to avoid damage to the liner due to contact with the shovel. As an added precaution, the drainage material directly above the liner was removed by hand to limit the equipment contact with the liner.
2. Once the liner was reached, the excavation was expanded until approximately 1 foot of the liner was exposed. A piece a Geotextile slightly smaller than the liner was placed directly on top of the exposed portion of the liner. This Geotextile acts as a pad between the liner and the pressure transducer and eliminates direct contact between the two. Figure 3 shown below represents a typical pressure transducer installation diagram.

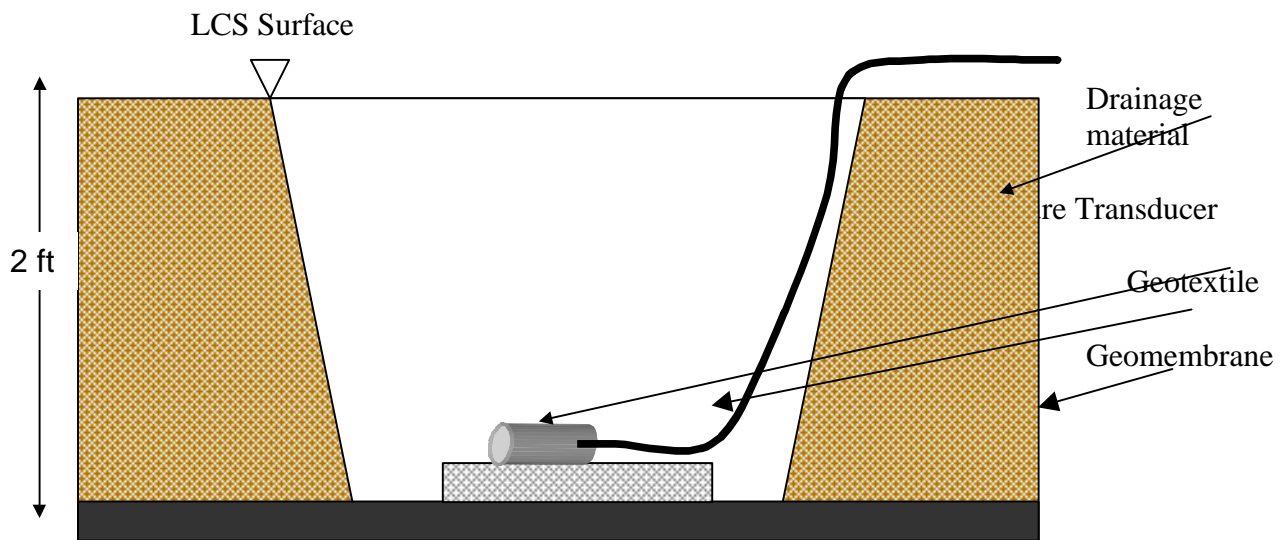


Figure 3. Typical Pressure Installation diagram.

3. The pressure transducer was packed with marine grease and covered by a finger cot to reduce any biological growth that could form on it. Biological growth would result in erroneous readings from the pressure transducer and impair data analysis.
4. Finally, the pressure transducer was placed directly above the Geotextile and the excavated material was used to refill the excavation.
5. This sequence of excavation, placement of pressure transducer and refilling was continued till all the transducers were installed.
6. A Surveyor was hired to survey the locations over which the pressure transducers were installed to get the x, y and z co-ordinates.

Section 2. A Report on the Instrumentation Package

The instrumentation package used for the bioreactor project is provided by Campbell Scientific Inc. The hardware consists of a CR 10X Series Datalogger, an AM 416 Series Relay Multiplexer, a SM 716 Series Storage Module, a TE525 Series Tipping Bucket Rain Gage, a MSX Series Solar Panels and a Tripod Weather Station.

A Datalogger measures conditions and interprets electrical signals emitted by a pressure transducer. Once the datalogger has performed the conversion, the data is stored in the datalogger's memory. The datalogger is powered by a 12 V. D.C. battery, which is charged by the Solar Panel.

The primary function of the Multiplexer is to increase the number of sensors that may be scanned by the datalogger. The multiplexer is positioned between the pressure transducers and the datalogger.

The Tipping Bucket is used to gather information on the amount of precipitation that falls over the pressure transducer area. The Tripod Weather Station used for this project enables the researchers to install the hardware in a common place. This weather station is grounded so that the datalogger and multiplexer are protected from severe weather conditions that may arise at the site.

The installed pressure transducers are connected to the datalogger via four multiplexers. A datalogger software tool (PC2008W) developed by CSI is programmed such that the readings obtained by the pressure transducers are easily converted to get the head on liner in inches of water. Researches from UCF are currently working on the data analysis for the project. A typical plot of readings obtained by a pressure transducer (in inches of water) against time is shown in Figure 4. Please note that the graph enclosed is not inclusive of the x, y and z co-ordinate system and will not give a true representation of the ground profile.

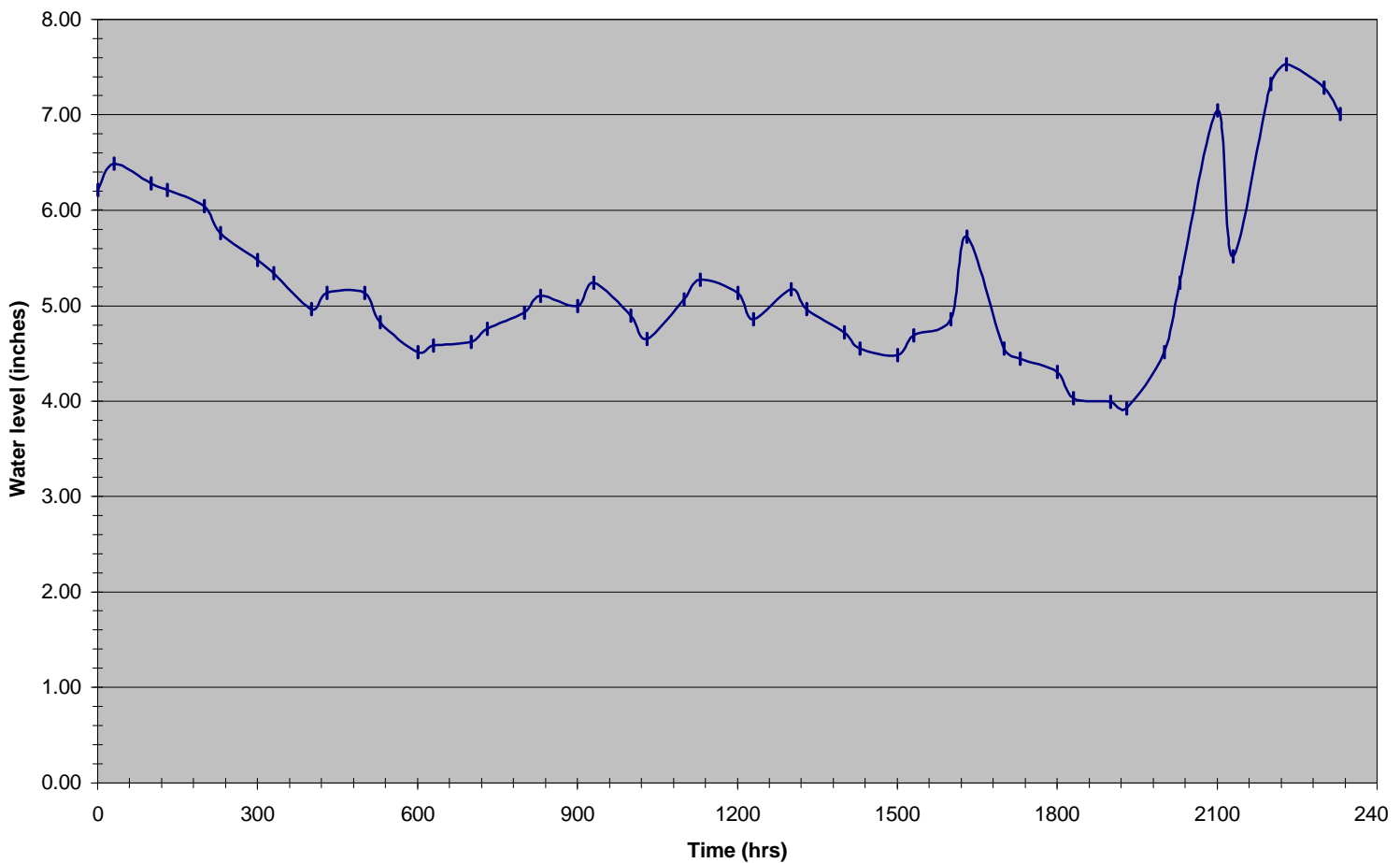


Figure 4. A plot of Time(hrs) vs Water level (inches) recorded by a pressure transducer