Florida driller

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THE EXPANDING WORLD OF REVERSE CIRCULATION DRILLING

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THE RIG AND THE DRILL TEAM ARE THE GEOLOGIST'S BEST FRIENDS

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This article is the first of three that describe the early days of drilling in the 1960s through present day through the eyes of a geologist and driller. Part I covers the primitive equipment used for engineering soils testing and early environmental drilling through the early 1980s. Part II covers the development of environmental drilling standards and improved coring tools while Part III describes the drilling equipment used for drilling thousands of shot holes for seismic exploration across Florida's varied terrain.

INTRODUCTION

My best days as a geologist over 55 years have been working in the field drilling holes to see what is beneath the surface. If I'm allowed to count the rock cores, ice cores, water wells, monitoring wells, seismographic shot holes and oil wells that I have been involved with I have probably drilled 25,000 holes in the earth. Many were drilled under Florida Water Well Contractors License #2543. Not all holes were drilled with me opening core barrels, but for the ones where I was present, the process of opening the core barrel is like being the first person to read a new book of knowledge. Multiple borings help a geologist create a model of the "block of rock" in the project area. Field geology is rewarding. Working with knowledgeable drillers and crewmembers as a team is a great experience and all members benefit.

The years have exposed me to the evolving array of rotating machinery and too many knowledgeable individuals with whom field and travel time was spent. I learned the range and capabilities of the equipment and assimilated the knowledge of the other folks involved over field assignments. This Part I story looks at the early work in environment drilling so important today.

ICE CORING

As a bit of nostalgia, in the summer of 1965 at geology field camp, I had the opportunity to study glaciers in Alaska. My drilling career started the hard way with an ice coring tool that was constructed much like a bucket hand auger that you can get from Art's Machine out of the Forestry Supply catalog. Being the big, strong athlete, I was the main motive power to core five 25-foot holes through snow pack and solid glacier ice over a few days in July. This was early environmental drilling to understand the changes in climate over the past 250,000 years. My borings were examining ice that was only a few hundred years old.

WASH BORING

Right out of Michigan State University in 1967, I started with the Michigan Department of State Highways (MDSH) in the Testing and Research Laboratory in Lansing, Michigan. One of the early tasks was an assignment to a wash boring crew to supervise the gathering of excavation (cut) volumes for road projects that crossed peat bogs. The glaciated terrain of Michigan has many bogs and kettles filled with organic materials that must be excavated and backfilled to build highways. The design engineers need the volume to be removed and backfilled. The bogs did not support vehicles, and foot traffic was limited most of the year except in winter when the surface was frozen. The drilling solution was "winter-season" wash boring with 3-inch diameter pipe in five-foot joints, several 48-inch forged Ridged pipe wrenches, a pipe tripod, a 125-gallon per minute wash pump, a temporary water source well outside the bog areas, and hundreds of feet of fire hose. The pipe joints were assembled at the location and stood up with a hose fitting on top. The materials and equipment were brought to the site on skids pulled by a small tracked vehicle.

The trick of wash boring was the weight of the string plus the 600-900 pounds of live weight down pressure available. The drill advanced with two or three guys on a small platform clamped to the pipe or standing the

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pipe wrenches. The guys were holding on to the drill pipe and the tripod and jumping and gyrating up and around like the dance of the 1960s called the "Twist." By afternoon everybody was sweaty, wet and cold.

MOBILE B-52 DAYS

I soon moved to the job of the supervisor, time sheet signer, college kid and the third hand on a soil boring rig. The rig in 1967 was a Mobile Model B-52 mounted on a Dodge D-500 four-wheel drive chassis. The B-52 had a 5-foot mast with a rotary table drive and most of the drilling was 6-inch open flight auger (pre-hollow stem days). The B-52 was a sturdy rig, but the short mast meant a lot of tool handling and I kept up my weight training racking augers.

My best personal takeaway was the good information that the crew provided. The driller and main helper were both WWII army sergeants who had been drilling for 20 years and knew how to get things done. Most important, how to live on the road. My early years' training was from the crewmembers. I have fond memories of lunches in the field with beef stew cooked in a can on the exhaust manifold of the deck engine.

EARLY TOOLS FOR ENVIRONMENTAL DRILLING

Soil sampling with the Mobile B-52 in 1968

In 1967, a boring drilled to 30-40 feet in sandy gravel would stay open for ten minutes. The sand and gravel formation materials would be in the cone of materials on the surface. The depths of the sand, gravel, and clay zones would be the call of the driller as he advanced the augers. We were building the borehole stratigraphy as a team effort. The driller had 20 years on the controls so he could estimate depths automatically.

What was becoming important for preliminary engineering testing and the environmental drilling work soon to follow was the depth to water table. The drill crew and I invented a better tool to determine the depth to water table — a water level meter. Before our meter the depth was done with what the driller called a "plopper" — a ¾-inch bolt tied to a cloth surveyor's tape. The driller would lower the bolt and jiggle and plop the water table and read the tape. The photo shows the water level meter we developed and note that it looks like the commercial models available for the past 45 years. The Highway Research lab electrical engineer designed and built it. The bottom end was a piece of lead filled copper pipe and the cable hub contained the circuit board, a sonic buzzer and a light. The cable had footage numbers. We couldn't get a patent because we were with a public agency.

Water level meter in action in action; the MDSH chief soils engineer Don Malott, PE was reading water table.

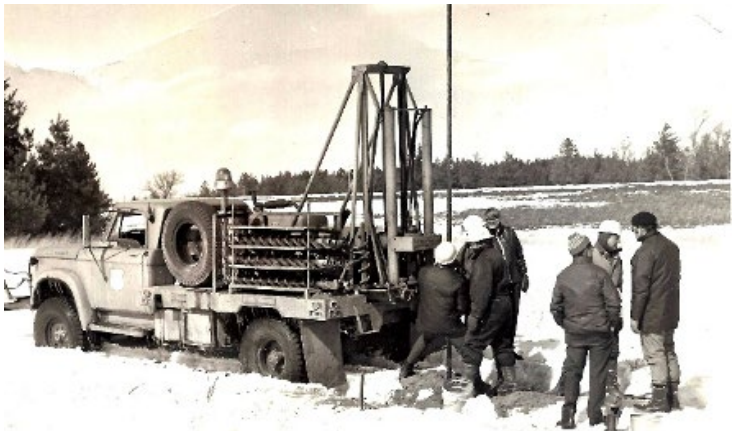
MONITORING ROAD SALT IN THE GROUNDWATER

The highways in Michigan are kept free of ice in the winter with plows and salt. In the late 1960s scientists were contemplating where the tons and tons of salt were going after the ice melted. Duh, the salt was going into the ground and into the shallow drinking water during spring thaw. Many rural areas relied on shallow well points for drinking water and folks near the roads were noticing strange tasting coffee.

The MDSH Research laboratory in 1969, was given the task of tracking the road salt in the unconfined aquifer. We used the B-52 in the sandy, glacial soils advancing the flight augers into the surficial zone and "spun up" material soils to make a pathway for the well point. We set the monitoring wells using 1 1/4 or 2-inch black pipe for casing and an 18-

inch, 10 slot Johnson drive point screen. The points were pushed to 20-30 feet with the rig or by hand into pre-drilled holes. The photograph shows hand installation which took only 2-3 minutes after the augers were pulled. We developed and sampled the wells with an old time “pitcher pump” in the days before Grundfos pumps.

There were no standards for monitoring wells or environmental drilling in the 1960s, so we developed the early methods. The materials were black pipe and later galvanized. Our target was to determine chloride concentrations and to chase the plume, so pipe corrosion was not an issue. We sampled and pulled the casing after one season. The project lasted until 1973 and when all of the wells were pulled. The study data was used to adjust the amount of salt used to keep roads clear.



Monitoring well points along I-75 near Roscommon, Michigan the winter of 1969-1970; Dr. Herbert is on the right.

DEEP WATER WELL – AN EARLY USDW DETERMINATION

The biggest drilling rig I ever used was in 1983 in Santa Rosa County, Florida. Getty Oil Company drilled a 2,500-foot aquifer test well to locate the USDW in the middle of East Bay from a very large barge oil rig owned by Atlantic and Pacific Marine Corporation. The oil test well was to 18,001 feet but the rated capacity of the rig was to 25,000 feet (see photo). There was no deep aquifer, USDW knowledge in that area of the Panhandle but the oil permit regulations required that the aquifer protection casing be set below the base of the USDW. The Northwest Florida WMD took the lead on this task and a fellow known to many of you, Dr. Tom Kwader, was at the water management district and supervised the logging. The food on the rig was outstanding including a soft ice cream machine in the galley. Many drillers and engineers passed through this project taking the time to explain the oil and gas drilling business. This business network was the start of the Lampl Herbert consulting work over 42 years.

Getty Oil Company drilling in East Bay in 1983.

Written by Thomas A. Herbert, Ph.D., P.G.

In 1973, Tom moved from Michigan to Tallahassee, Florida, to a five-year position as staff director for natural resources in the Florida House of Representatives. The state’s major environmental legislation in the mid-1970s governing water, mining, coastal protection, land planning, public lands acquisition and oil and gas exploration passed through the natural resources committee. In 1978, Tom and his business partner Dr. Linda L. Lampl, started their consulting business to assist public and private clients to understand the complexities of the resource development process. During the 42 years of consulting, the firm of Lampl Herbert Consultants has worked on quite a range of natural resource development and environmental assessment projects with public and private groups that go beyond the field of geology. Tom is a professional geologist in Florida, Georgia, Alabama, Mississippi, New York, and Alaska. He was a Florida Water Well Contractor for 28 years, license #2543. Tom has degrees in geology and a PhD in Resource Development from Michigan State University.

Tom has served on numerous boards and task force groups including: first chairman of the Florida Professional Geology Board (1987-1988), an organizer of the Florida Association of Professional Geologists (1996) ; founding member and currently president of the Florida Independent Petroleum Producers Association in 1988 and chairman of the Florida Underground Pollution Task Force (1997-1998), member of the Clean Soils Forum, and member of the 1990 Oil Spill Task Force in Florida. Since 1992, he has been teaching in the Department of Earth Oceans and Atmospheric Science helping with courses in geologic hazards and petroleum geology. His teaching goal has been to provide mentoring guidance and encouragement for graduates to understand the emerging workplace and the roles of geologists.