

Iron Story TITLE:	Back End of a Shovel
Subject: (main topic)	Work, Changing the World, Home
Key Words: (other topics)	Farm, Imagination, Seismic, Travel, Oil & Gas, Workstations, Lightning.
Synopsis: (teaser overview)	I grew up on the back end of a shovel on the Star Ship Enterprise.
Story Source:	Private 🖌 Ancestry Historic Other
Story City, County, State:	Nelson Farm Enoch, Utah, USA Latitude: 37.747187 Longitude: -113.55838
Word Count: (Length)	3,709
Reader's Age Range:	12+
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I grew up on the back end of a shovel, on the Star Ship Enterprise. The Nelson Farm is the last farm on

the west of Minersville Road going North, before you reach Midvalley Road, as shown on the GoogleEarthtm image to the right.

I was like any of the other boys who grew up in Cedar Valley in the 1950's and 1960's. Loved to play and work outside. My source of income through High School was from selling a Stock Show Calf at the Annual Livestock Show.

In order to sell a stock show calf, I had to be active in 4-H. Parowan High School had an FFA Branch (Future Farmers of America), and Cedar High School did not. This was fine with me, because 4-H was fun. When my friends got too old for 4-H, Ray Gardner and Doug Grimshaw and I invited 18 of the most popular girls at school to be in an Automotive 4-H Club, so they learned how to fix a flat tire and change oil.

Like other farm boys in Cedar Valley, there was always water turns to be taken care of. I grew up before sprinklers, and so we irrigated the farm by hand with a shovel. Every spring Dad would have me take a propane tank and burn the weeds in all of the major irrigation ditches. Then Dad would drive a tractor with wide front tires, one on either side of the ditch, dragging a triangular ditch digger. The 2-foot-tall blades pushed all the sand and mud and weeds out the ditch. One of the main ditches went right through where Gateway Academy is now.

Then we would go back with a shovel and dig out head ditches, to put water in about 30 furrows. Then we would dig smaller head ditches, for about 10 furrows each. It was a lot of work getting set up to start watering the crops each spring. Once you have done this type of work, you never forget how to use a shovel.

When we moved back home, after spending 40-years in the wilderness of Texas, I was helping others with the Sons of Utah Pioneers erect a new monument describing an aspect of the history of Southern Utah. Boyd Fife watched me moving dirt around, and said, "It's good to



have someone move back here that knows how to use a shovel."



We did not have a television when I was young. As I recall, we got our first television in the late 1950's. By the time I was 16, and Star Trek – The Original Series – was being broadcast, and we had a color television set. I absolutely loved Star Trek. I could see myself flying off on the Star Ship Enterprise and exploring new worlds. Some of us are blessed with a wonderful imagination. And Star Trek helped my imagination soar.



The Nelson Farm and the Star Ship Enterprise taking off from the farm to explore new worlds.

Life has a way of bringing us back to reality. Every night there were cattle to feed. When I was 12-years old, it was time for me to start to learn the family business. I had bad allergies. Pollens, molds, and especially alfalfa dust created hives on my skin and made it so I could hardly breath. So, Dad had me start working at Nelson Meat Packing Plant. My job was to run the new electric skinner. I would drive a cow up the chute, shoot it in the back of the head, and by the time I was back inside on the killing floor, the cow had been blead, was propped up on its back, and its four legs were skinned. I would take the electric skinner and separate the hide from the meat, starting at the belly and working down to the back, on both sides. It was important how the electric skinner was held, so that you did not scar the leather. The hides were sold to make leather for boots and shoes and belts and gloves and saddles.

Then the carcass would be hooked to a big iron triangle and hoisted up to be put on hooks with wheels on them, that ran on a rail, which ran through the facility. As the carcass was lifted up, the entrails were removed and taken out to be hauled to the Byproducts Plant, a quarter mile to the north. Bones and other unused portions of the carcass were cooked at the Byproducts Plant. Grease was pressed out of the resulting material, put in barrels and sold. The press created cakes about 3 foot in diameter and about 3-5 inches thick. These cakes were ground up, and the resulting protein sold to Barlocker's in Enterprise for turkey feed. After the kidneys and other entrails were removed, it was time to go back and get another cow up the chute, and to start the process again.

I worked at Nelson Meat Packing Plant from the time I was 12 until the summer after my first year at the University of Utah, when I was 19. President Lyndon Johnson had passed The Wholesome Meat Act of 1968 the year before. It gave all small meat packing plants in the United States 12 months to modernize with aluminum tables and meet Federal Meat Inspection Standards. We had wooden tables and sawdust on the floor to catch any blood that fell off of a carcass. The inspectors came in, like Klingons attacking Plant. Dad left, and as the bosses' son, I had to tell and fire Bob Goodwin and Gerald Black. I had worked next to Bob for over 7-years, he was my dad's age, and I was 19. On a happier note, there are a lot of funny and interesting stories about things that happened at Nelson Meat Packing Plant. However, these stories are not tied to things I learned on the back end of a shovel and watching the Star Ship Enterprise.

I left for England at the end of the following summer, when I was 20, to serve a 2-year mission for The Church of Jesus Christ of Latter-Day Saints. My call was to the British Mission, the church's first foreign mission. As we arrived, the mission's name was changed to The England East Mission.



Serving in England was a very good experience. Like most parts of life, there were downsides. Our Mission President was disfellowshipped from the church because of mistakes he made with finances, teaching material, and choices about how to record ordinances. To me this was just like when a prairie dog digs a hole between two furrows, and you have to get rid of the prairie dog and use a shovel to fix the furrows. Mistakes happen. When they are recognized, they need to be fixed. This happens on a real mission, not just on a fantasy mission on the Star Ship Enterprise.

The summer after Nelson Meat Packing Plant was shut down, I worked for Pan American Petroleum as a Professional Assistant to the Geophysicists in Denver. This job came with a scholarship I applied for and was given. I thoroughly enjoyed the work helping the geophysicists. The biggest issue was they did not start work until 7:30, and they were finished by 4:00. So, I got another job, at The Red Barn, to help pay for my mission. There are significant advantages to having learned to work, when I was growing up. The summer after returning from my mission, I was able to get a job with the same oil company, which company had been renamed Amoco Petroleum, while I was in England.

I learned about seismic acquisition and seismic interpretation working in Denver. Once when I was on a seismic crew, the Senior Observer asked me to take a transit pole across a valley to a place on the other side so the surveyor could measure the distance. There was a small stream in the valley between. I recognized it might be a problem because of having dropped a tractor to it's axel in the mire once on the farm. So, I gunned the truck and drove right across the stream. The Crew Chief followed my same tracks, only slower, and ended up getting the truck stuck in the mud up to the axle. There are real world advantages to having grown up on a farm on the back end of a shovel.

The seismic interpretation work was most interesting to me. I made 3-D fence diagrams, to better visualize the subsurface geology. When I got back to school at the University of Utah, I used what I learned to interpret the base of the most recent (Quaternary) sediments in Yellowstone Lake from a sparker seismic survey. One of the graduate students had taken a boat along a grid of lines on the lake, with a sparker seismic source, which sent sound waves down in the lake, which sound waves were reflected off of the bottom of the lake and off of different layers of sediments underneath the bottom of the lake. The reflected energy was recorded by hydrophones being towed by the boat. The result was a fence of 2-D cross-sections covering the lake. I interpreted the first significant reflector under the lake bottom, and made a topographic map of this surface. This was very exciting to me. I was mapping new worlds, the surface covered by material from recent erosion. This is deposition that has happened since the caldera-forming eruption happened about 2.1 million years ago. No one had ever seen the shape of this surface before my map. I was back on the Star Ship Enterprise.

Then Robert Otis, my friend who helped me get the geophysics scholarship, took my map and converted it to a threedimensional image. This was just like | the stuff Spock did. The 3-D view made it so much more intuitive to see the boundaries of the caldera, and to better understand how Yellowstone Lake had formed and filled up with sediments. This changed my life. I became very interested in making all geological interpretations this easy to understand.





Graduation with a Bachelor's degree in geophysics from the University of Utah was the summer after the Yom Kippur War (6-25 October 1973). The world was falling apart (just like it is in 2022). Oil prices were at an all-time high (just like they are in 2022). Oil companies were offering salaries exceeding what our professors were making. So, I took a job with Mobil Oil, in Dallas, Texas. I worked at Mobil for 5 ¹/₂ years. They sent me to Nigeria three times, and I worked on seismic interpretation projects from the Dutch North Sea, to Norway's largest oil field (Statfjord), to the South China Sea, to Peru, to Argentina and the Falkland Islands, to the first lease sale in Brazil, to several projects in Nigeria and West Africa, to several lease sales in the Gulf of Mexico. My first day of work at Mobil I had refused to sign the patent release forms because I had an idea, based on my Yellowstone Project and 2 summers in Denver, for creating an interactive 3-D seismic interpretation workstation. We worked through that. I attempted to get Mobil management interested in my ideas, and I ended up leaving because the bureaucracy was not able to process a new idea and think in a different way.

I met an X-Mobil Ph.D. Geophysicist named Fred Hilterman at a school he taught at on 3-D Seismic Techniques in Houston, Texas. He ended up recruiting me to run his research Seismic Acoustics Lab (SAL) at the University of Houston. I worked at the University of Houston for 3-years, and created a new umbrella lab (Allied Geophysical Labs), managing SAL, the Research Computation Lab (RCL), Image Processing Lab (IPL), Well Logging Lab (WLL), and the Field Research Lab (FRL). We doubled oil company industry sponsorship and created a lot of new ways to look at seismic data and the subsurface. I wrote a book about things we were learning and doing, named **New Technologies in Exploration Geophysics**. The book was later translated to and published in Chinese.





There are photos in the book of collecting seismic data for Mobil Oil in Cedar and Parowan Valleys. The things I learned growing up on the back end of a shovel on the Star Ship Enterprise continued to be a theme in my professional life. The work we did at the University of Houston's AGL prototyped, so others could understand, what was in my mind, the ideas generated after making the Yellowstone Lake map.

Five of us ended up owning founding shares of a new company to exploit these ideas, Landmark Graphics Corporation. Landmark built the first stand-alone interactive 3-D seismic interpretation workstation. It did what I imagined could happen, when I worked for Amoco. Instead of using colored pencils to interpret geologic layers on large paper seismic cross-sections, we allowed geophysicists and geologists to display and interpret seismic data on a workstation. The results were phenomenal. All oil companies adopted our technology, or other versions of the technology which we initially introduced and developed. Virtually all of the major oil and gas fields found since 1985 have been found using these interpretation technologies. This technology is a primary reason we have not had gasoline shortages, long lines at gasoline stations, and rationing of gasoline, since the 1979 Jimmy Carter administration.



3-D view of extracted seismic volumes from a 3-D seismic workstation for a Gulf of Mexico project.

Landmark Graphics became a large company. I left in 1994 and founded another company, HyperMedia Corporation, tied to the Internet. I guaranteed loans with Landmark Stock, which price dropped by about half. The bank called my notes, and I almost went bankrupt. Didn't, but I lost all of my Landmark Stock. Two years later, Landmark was sold to Robert Chaney, President of Halliburton, for \$560 million. On Landmark's 25th Anniversary in 2007, the Landmark Division of Halliburton had over \$1 billion in sales.



Since shutting down HyperMedia Corporation, I have been involved in a variety of innovative start-ups. At Continuum Resources International we developed the first commercial three-dimensional virtual reality visualization theaters for the oil and gas industry. We built visualization theaters in Perth, Australia, at Imperial College in London, and in Houston on west I-10. The two universities were part of the University Program I started at Landmark Graphis Corporation. At Continuum, we replicated and displayed a multi-gigabyte seismic survey at each site, and used virtual reality for individuals to simultaneously fly around this volume in small crafts, which looked like paper airplanes with our photo on them, and interact with each other. We did this by sending state changes over standard IDSN (Integrated Services Digital Network). This Technology, which was at its peak about 2000, was the closest commercial project I've seen comparable to the holodeck on the later seasons of Star Trek.



In my career, I had the privilege to work on data from projects all over the earth, as shown on this map:

Yellow squares locate one exploration project, Blue 2, Green 3, Gold 4, Orange 5, & Red 6+ projects.

I also travelled a lot. When at Mobil Oil I went to Nigeria 3 times, as well as to The Cameroons, Senegal and Mauritania on the West Coast of Africa. I worked on, or was in charge of geophysics for seismic crews: offshore Nigeria and The Cameroons; Hugoton, Kansas; Kalamazoo, Michigan; Mesquite Nevada; Alvar, New Mexico; Findley, Ohio; Sayre, Oklahoma; Seminole, Pecos, and Laredo, Texas; Cedar City and The Great Salt Lake, Utah; as well as Big Piney, Gillette, Green River, and Rock Springs, Wyoming. I have taught courses in Sydney, Melbourne, and Perth, Australia; Los Angeles, Bakersfield, Ventura, and Bakersfield, California; Calgary, Canada; Denver, Colorado (many times); Washington, D.C.; Dubai; London, England (many times); Paris, France; Derha Dun, India; Jakarta, Indonesia; New Orleans, Louisiana (many times); Minneapolis, Minnesota; The Hague, Netherlands; Cornell and Lamont-Doherty Earth Observatory, New York; Stavanger and Kristiansand South, Norway (many times); Dharan, Saudi Arabia; Houston, Texas (many times); Caracas, Venezuela; and Beijing, Zhou Xian (now Zhou Zhou), and many other places in China. I made over 60 trips to China, and helped find 2 world class oil and gas fields: Dabei-3 has 130 billion cubic meters of gas, where 100 BCM is consider a giant gas field; and the Bohai Bay field, which had initial production of 3,700 barrels of oil per day and was reported as "the largest find in China in 10 years" by PetroChina's Vice-Chairman and President, Jiang Jiemin.



The Utah Geological survey published some of the seismic lines collected when I was running S-2, the Mobil Seismic Crew which collected a 2-D seismic survey between the north end of Cedar Valley and Parowan Valley. The image below shows a map, with the location of Dad's farm in orange, and the location of Mobil Seismic Line-711, shown on the map in red between A and A':





Moenave Formations, undifferentiated; Tks - Triassic sedimentary rocks; Pzs - Paleozoic sedimentary rocks.

The reflection seismic cross-section shows a picture of the underground geology along Line-711 (A-A').



Since 2008 we have been developing a new branch in the geophysical services industry. We formed a new Delaware Limited Liability Company called Dynamic Measurement, LLC. We are data mining lightning strike databases and mapping subsurface geology, anywhere.

At about 15, when I was still learning to work the back end of a shovel, Dad had me plow fields which had never been plowed before. The west side of the farm, northwest of the Byproducts Plant, where there is a 150-foot jog to the west. The sage brush in here was over six feet tall, taller than the tractor, had been there before the pioneers came, and was very thick. It was a great place to hunt rabbits and pheasants. I went in with the big plow, and was able to get all of the sagebrush and willows dug up. Then they were raked into one place and burned. Then the whole area was plowed. It took most of one spring to do all of this work. The next to the last time to plow from the top to the bottom of that field a summer rain storm came up. I figured I could go down, and back up, before it got too muddy. As I started north on this last row, every hair on my body stood straight up and then a lightning bolt hit right next to the tractor. The thunder was so loud I thought my ear drums were going to burst. I turned off the tractor, and crawled to Nelson Meat Packing Plant, very scared. This would have been the summer of 1965.

Fast forward 40 years, and one of my friends in Texas was hunting ducks on his property next to the Hockley Salt Dome in west Harris County. A summer storm came up, and a lightning strike hit right next to his truck and scared him, like I had been scared 40 years before. A year later he was back at the same place, hunting ducks again, and another lightning strike hit the same place. He got in his truck, drove to my place, and asked, "Roice, does lightning strike twice in the same place, and if it does, does it mean I have oil under my property?" It did not take too long to demonstrate the answers to both questions are "Yes." After 14 years of study and work, we have 2 issued U.S. Patents regarding using lightning databases as a geophysical exploration tool, and have an exclusive license to use the best lightning analysis project for Jay Grimshaw, one of my childhood friends, on a mineral lease he has over by Newcastle. These maps and cross-sections show what the subsurface geology looks like, using our lightning analysis technologies:





After spending 40 years in the wilderness of Texas, and a few other places around the world, it is good to be back home. When I was growing up, and working on the back end of a shovel, those I worked with told me the red dirt gets in your blood, and you have to come back to it. Guess that fable is true in my case.

I went from Kindergarten to Third Grade at North Elementary. Then I went to South Elementary for fourth to sixth grade. The Junior High School was where the parking lot is now, kitty-corner to where the Southern Utah Museum of Art (SUMA). We were the first class to go from nineth grade through twelfth grade at Cedar High School. I graduated, a Cedar High Redman, in 1968. I graduated with a degree in Geophysics from the University of Utah in 1974, after serving a mission for The Church of Jesus Christ of Latter-Day Saints in Southeast England. And the experiences I have summarized in this story are all built on what I learned in these schools, on the back end of a shovel, and watching shows about the Star Ship Enterprise. You can see how I have grown and changed along this process with these three photos:



It is good to be home in Cedar City. What's next? Hopefully more of the same. We are actively pursuing lightning analysis projects, and involved in CCS (Carbon Capture Sequestration) nationally. I'm using my geophysical experience to help with our valley's water issues, and some listen, including Mayor Green. Al Matheson, Frank Nichols, and I formed the Southwestern Heritage Center (swhchs.org), to capture and retain and share the wonderful local heritage. My wife Andrea and I enjoy our garden, in back of Grandma Nelson's house, where my cousin Edwin Gurr and his family now live. We have had nice gardens in 2016, 2017, 2018, 2020, and 2021. I get to work on the back end of a shovel, and think about how wonderful, and how hard, life has been. As Candide said, "All events are interconnected in this best of all possible worlds, ... but we must cultivate our garden."

