

OIL SHALE ON CHRIS'S CREEK

Juab County, Utah

The Mystery of the Legendary First Retort

by

ARTHUR L. CRAWFORD



CIRCULAR NO. 41

of the

UTAH GEOLOGICAL & MINERALOGICAL SURVEY

affiliated with

THE COLLEGE OF MINES AND MINERAL INDUSTRIES

University of Utah

Salt Lake City, Utah



June, 1961

UTAH GEOLOGICAL AND MINERALOGICAL SURVEY

The Utah Geological and Mineralogical Survey was authorized by act of the Utah State Legislature in 1931; however, no funds were made available for its establishment until 1941 when the State Government was reorganized and the Utah Geological and Mineralogical Survey was placed within the new State Department of Publicity and Industrial Development where the Survey functioned until July 1, 1949. Effective as of that date, the Survey was transferred by law to the College of Mines and Mineral Industries, University of Utah.

The *Utah Code Annotated 1943, Vol. 2, Title 34*, as amended by *chapter 46 Laws of Utah 1949*, provides that the Utah Geological and Mineralogical Survey "shall have for its objects":

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ARTHUR L. CRAWFORD, *Director*

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College of Mines and Mineral Industries

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Salt Lake City 12, Utah

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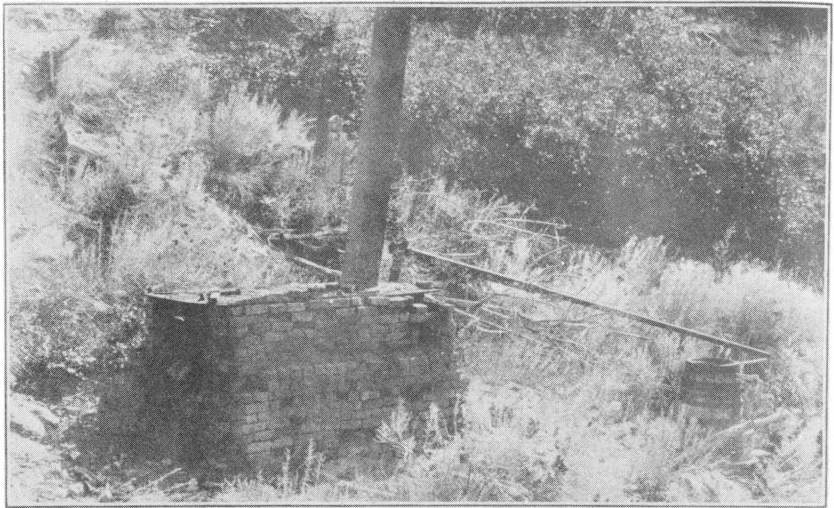
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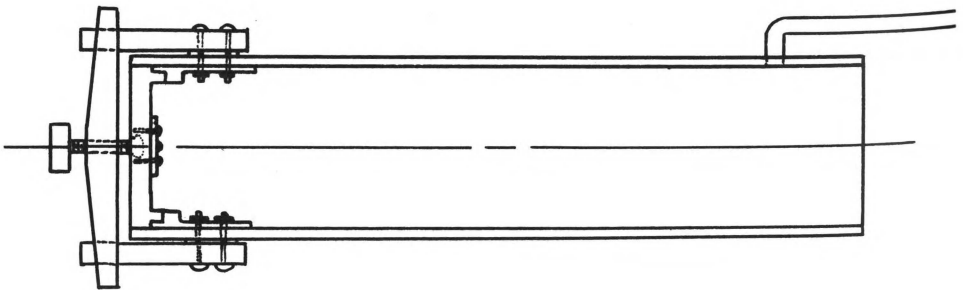
Frontispiece from:



The legendary oil shale retort photographed by Dean E. Winchester in 1916, and reproduced as Plate XI in United States Geological Survey Bulletin 691.

The following is reproduced from Winchester's long-hand notes and penciled sketch found by Elizabeth Wellshear, Librarian, with Dean E. Winchester's material in the Photographic Library and Field Records File of the U. S. Geological Survey.

"Made of $3/4$ -inch iron, cylinder 8 feet long by 20 inches inside diameter. Cast head pieces clamped on by single screw.



"Retort set in brick oven covered with cast iron plates. 8-inch chimney leading from rear top plate. Chimney has cross damper.

"3-inch pipe leads off top rear of retort about 15 feet over a wood barrel containing $3/4$ -inch pipe coil. This is not connected with escape pipe but may have been at one time, altho there is no evidence at present."

OIL SHALE ON CHRIS'S CREEK,
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by
Arthur L. Crawford, Director
Utah Geological and Mineralogical Survey

ABSTRACT

"Before petroleum was discovered in Pennsylvania, the Mormons distilled oil from shale near Juab, Utah, where the ruins of an old still can yet be seen. (Pl. XI)"²

The discovery of Winchester's original negatives, field notes, and sketches, in the archives of the U. S. Geological Survey establishes the retort site as being in the drainage of Chris's Creek, about 5 miles south-southeast of Levan, Utah. On September 3, 1960, the remains of the old retort photographed by Winchester were positively identified and photographed in Shale Hollow, a south-draining strike ravine entering Chris's Creek approximately one half mile east of the Salt Lake Meridian.

There is little doubt that this was the first oil shale retort constructed in Utah. Alma C. Dalby of Levan remembers seeing the original retort about 1898 and hearing Steve Moss tell Dalby's father the story of the extraction of oil by use of this retort. Circumstantial evidence indicates that the retort was constructed after the discovery (1854) of coal at Wales, Utah, and before the outbreak (1865) of the Black Hawk War. Hence, Winchester's off hand statement was probably founded upon accurate information, though it is now little more than a legend.

1. This paper was presented before the geologic section of the Utah Academy of Sciences, Arts, and Letters, at Logan, Utah, October 28, 1960. The Abstract will be published in the Proceedings for this meeting.

2. Winchester, Dean E., 1916, U. S. Geological Survey Bulletin 691, page 141.

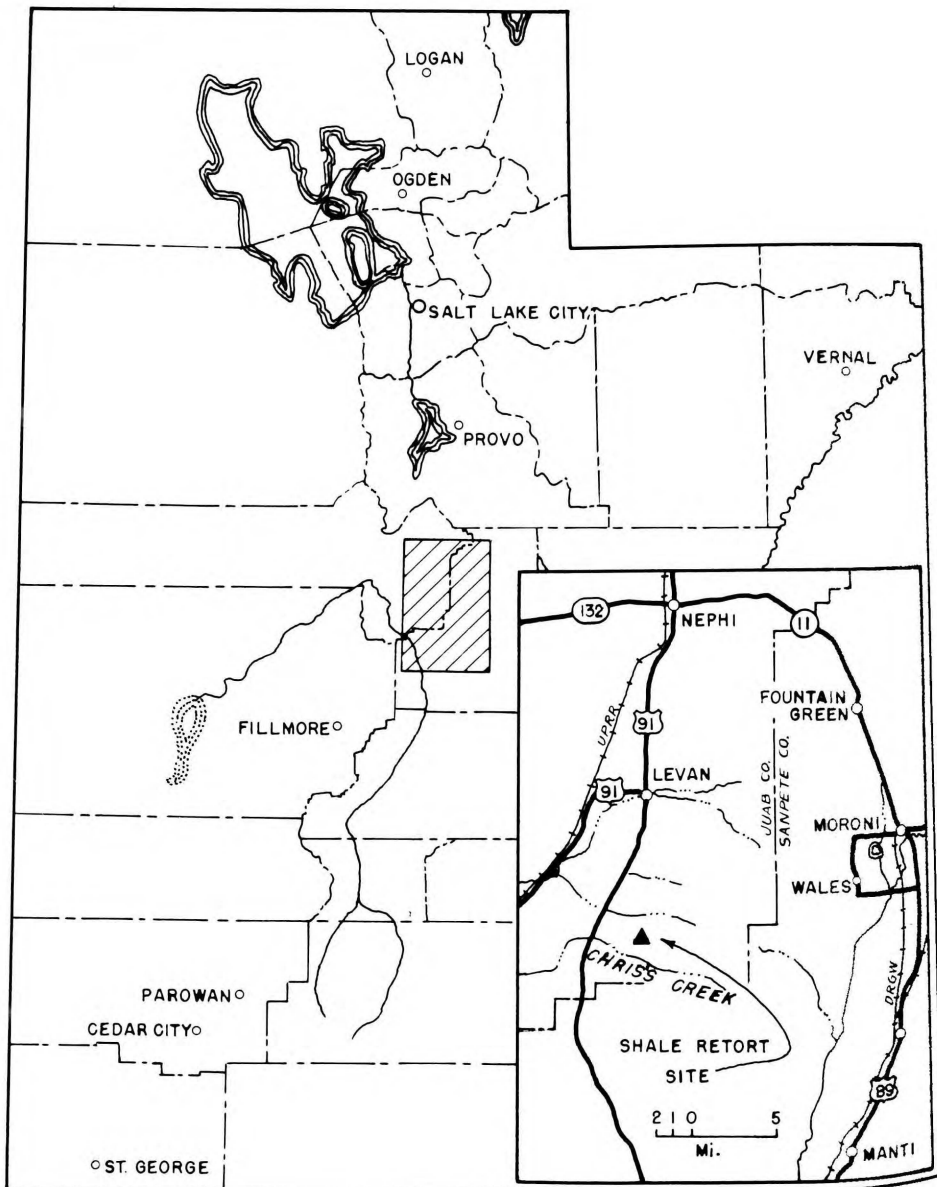


Figure 1. Index Map of Utah, showing the location of the site of the legendary oil shale retort presumed to have been built by the Mormons between 1854 and 1859.

INTRODUCTORY NOTE--AN APPEAL FOR OLD DIARIES

The following is a progress report, needing more factual substantiation. The details of this "historical treasure hunt" are here given in the hope that some interested reader may be reminded of an outdated news item or of an entry in some pioneer diary that may illuminate the background of this legendary retort from which was obtained the first mineral oil in Utah.

After a decade of "watchful waiting", an equally interesting almost forgotten historical circumstance³ was drawn through the curtain of mystery into the light of documented proof. The author of this account here makes an appeal to any and all who may find clues that might lead to a similar validation of this footnote to history.

A LEGENDARY PRELUDE TO THE UTAH PETROLEUM INDUSTRY

As far back⁴ as 1694, Ele, Hancock, and Portlock made "pitch, tar, and oyle out of a kind of stone from Shropshire," England.⁵ Thus, oil was derived from oil shale long before August 28, 1859, when the Drake well in Pennsylvania ushered in the modern petroleum industry. In fact, even Utah appears to have had an embryonic oil shale industry prior to that date.

The Utah Geological and Mineralogical Survey for some time has had a project under way entitled "The Oil and Gas Possibilities of Utah, Re-evaluated." The extensive, rich, oil shale deposits of the state must be considered as a part of this "re-evaluation." In this connection, an effort has been made to authenticate a legendary claim that the Mormon pioneers built a retort near Juab, Utah, by means of which they extracted oil from oil shale before 1860.

In Bulletin 691 of the U. S. Geological Survey, by Dean E. Winchester (1918), there is shown as plate XI, a photograph of what is labeled an "Abandoned oil shale retort, near Juab, Utah." (See Frontispiece, page 4.)

3. Crawford, Arthur L., 1948, "The Meteorite (?) Discovery in 1938: A Confession of Error." Proceedings of the Utah Academy of Sciences, Arts, and Letters, v. XXV, p. 151-155.

4. Beskerville, Charles, 1909, "Economic Possibilities of American Oil Shales": Engineering and Mining Journal, v. 88, p. 149-152.

5. Eng. Pat. 330, 1697: Ele. Phil. Trans., 1697, v. XIX, no. 228, 544: Phil. Trans. Abridged IV, 168.

In a copyrighted booklet by J. B. Jenson, published in February 1921, entitled "New Shale Industry," reprinted from a series of five articles published in the Salt Lake Mining Review, the same photograph as used by Winchester is given with a label of "Salt Lake Mining Review" written across its face. Underneath the picture appearing in Jenson's booklet is the explanation, "Old Mormon retort near Juab, Utah, used by the Mormons 50 years ago."

Both Winchester and Jenson are irritatingly vague in their references to this pioneer "retort". Winchester merely says:

"Before petroleum was discovered in Pennsylvania, the Mormons distilled oil from shale near Juab, Utah, where the ruins of an old still can yet be seen. (Pl. XI)"⁶

After making the point that the retorting of oil shale was not new, Jenson, on page 22 of his booklet, says:

"Lubricating oil was also produced from western shales in limited quantities in the early history of Utah. An old retort used for this purpose is still in existence near Juab, Utah."

Similar statements in contemporary literature, all later than 1916, appear to have relied either upon Winchester, or Jenson for their authority. I have endeavored diligently, but thus far unsuccessfully, to find some pre-existing records from which these statements could have been drawn.

U.S.G.S. ARCHIVES YIELD WINCHESTER'S NOTES ON PIONEER RETORT

Jenson was a native Utahn. He had won national prominence as an oil shale retort experimenter dating back to 1902. His article carried the same photograph of the Juab retort as shown by Winchester. Therefore, since no credit is given in Jenson's article for the source of this photograph, and since Jenson's reproduction has "Salt Lake Mining Review" printed across the face of the picture, it was at first supposed that Winchester obtained his photograph from Jenson, or that both Jenson and Winchester had reproduced an older photograph belonging to the Salt Lake Mining Review. No evidence was found to substantiate either theory. After extensive inquiry through

6. Winchester, Dean E., 1918, U. S. Geological Survey Bull. 691, p. 45. The same statement, but without correlated photograph, is made by Winchester in U. S. Geological Survey Bull. 641, p. 141.

the U. S. Geological Survey, Elizabeth Wellshear, librarian, Denver Branch, found the original negative. It was in the Photographic Library and Field Records File collections of D. E. Winchester's material on Utah. She also found Winchester's supplemental diagram, with his longhand original notes describing the retort he had photographed "in Chriss Creek Canyon, southeast of Juab, September 1916." Miss Wellshear sent me a photostat copy of these longhand notes, together with a typewritten transcription. The diagram has been retouched and reproduced along with the photograph and Winchester's transcribed notes, as the Frontispiece on page 4 of this circular.

EFFORTS TO FURTHER SUBSTANTIATE THE LEGEND

A preliminary search of the records of the Utah Historical Society, the L. D. S. Church Archives, the University of Utah Library, and the records of the U. S. Bureau of Land Management have thus far been disappointing.

Dr. Clyde T. Hardy, who investigated the geology and has published on this area⁷, tells me that he has heard of no local traditions bearing on the subject. Tentative arrangements have been made to examine the Juab County claim records.

Chris's Creek⁸ is approximately midway between Little Salt Creek on the north and Maple Creek on the south, draining the west slope of that portion of the Gunnison Plateau immediately south of Levan, Utah. All three are intermittent streams which emerge onto the bajada along the east side of Juab Valley, the southern extension of what is commonly known as Levan Ridge.

SYLVESTER PIERCE AND OTHER OLD RESIDENTS INTERVIEWED

Sylvester Pierce (now 87 years old) spent his boyhood on the old Pierce Ranch at the apex of the alluvial fan formed by Chris's Creek. The Pierce ranch was sold by his father, George H. Pierce to the Chase brothers-- James, Sisson, and Solomon D. The ranch has since been

7. Hardy, Clyde T., and Zeller, Howard D., 1953, Geology of the west-central part of the Gunnison Plateau. Geol. Soc. America Bull. 64.

8. The spelling here used is that preferred over "Chriss" employed by Winchester, or the "Criss" version of Hardy and Zeller. The residents of Levan and of the ranches round-about always use the possessive form. According to Sylvester Pierce, the name originated from the fact that Chris (Christian?) Jeppsen (Jeppsen?) wintered a herd of cattle about 1873 in this drainage basin. The same confusion of spelling of the same name is found on the various maps of the U. S. Forest Service and others for the canyon and ridge between Reddick's Canyon (on the north) and Quaking Aspen Canyon (on the south) near the headwaters of Chicken Creek, approximately nine miles northeast of the old retort site. The multiple use of "Chris" is understandable. Christian, Christensen, Christiansen, and even Christison, in both the Danish and Swedish forms, were such common names in Levan and vicinity that many of the pioneer residents of "Little Denmark" adopted new names (i.e., Dalby, Warner, etc.) as a more convenient means of identification.

known as the Chase Ranch and is now owned by Roy Chase, a son of James. Sylvester Pierce is a sheepman who has ranged his sheep widely in this area. So far as known, he is the oldest man who has an intimate knowledge of the region.

The late Dr. D. G. Edmunds, formerly of Wales, Utah, a small hamlet on the opposite side of the Gunnison Plateau, owned the range on Chris's Creek and adjacent areas. As a boy and during many seasons since, he and his herders trailed sheep over the mountains from Wales to Juab Valley, along the headwaters of Chris's Creek and its tributary, Shale Hollow.

Hoitt Moss of Levan, Utah, now owns the area around the old Juab Station and the grazing land to the west on Long Ridge, where Green River oil shale outcrops and where the retort reported by Winchester as being "near Juab" was at first assumed to have been located. Hoitt Moss has spent his lifetime in this area and knows it intimately.

In answer to a questionnaire, Hoitt Moss disavowed ever having seen any old ruins or other indications that a retort had been located anywhere on the west side of Juab Valley. Sylvester Pierce, Dr. D. G. Edmunds, Roy Chase, and his brother, Dr. Daryl Chase, have each either been interviewed at length or, through correspondence, have contributed such information as they possess bearing on the investigation. Correspondence with Roy E. Gibson, editor of the Times News of Nephi, Utah, has been helpful, but disappointing in not yielding more tangible details.

THE "JUAB" RETORT TRACED TO CHRIS'S CREEK

Mr. Gibson reported that Mr. Alma C. Dalby, living in Levan, Utah, was the only man he had ever heard speak of any traditional evidence that would seem to substantiate the statements of Winchester and Jenson.

I sent Dalby a copy of the photograph taken by Winchester, with quotations concerning it, and requested any information he might be able to give which would shed light on the background for the old oil shale retort. He wrote that the tradition was too involved to tell briefly in a letter, but that if I would come down, he would be glad to visit the locality with me and give me such information as he could. He did write, however, that the retort had been on Chris's Creek, southeast of Levan--not on Long Ridge, west of Juab. Soon after this, the information from the U. S. Geological Survey Archives in Denver was received, fixing definitely the location of the old retort as having been on Chris's Creek.

EXPEDITION ARRANGED IN SEARCH OF THE RETORT RUINS

Arrangements were made with Sylvester Pierce, Ernest pierce (Sylvester's son), and Alma C. Dalby to meet me at Levan and visit the area of Chris's Creek. Mr. J. E. Hanson, an old resident of Levan (now in his "eighties") and three Dalby boys, Richard, Carl, and Alan, all grandsons of Alma C. Dalby and J. E. Hanson, also accompanied us in making the Shale Hollow examination on Chris's Creek.

Before making the trip, Hanson said he knew of the scattered remains of an old still in Shale Hollow, a north tributary to Chris's Creek. However, Hanson's description of the location and the nature of the still did not harmonize with Dalby's boyhood memories, so that the divergence of proffered guidance threatened to delay the completion of the investigation before the arrival of an approaching storm.

LEGEND TRACED TO STEVE MOSS ABOUT 1898

Dalby's story is that about 1898 he visited with his father a north tributary on Chris's Creek, in which at that time he had seen an old abandoned oil shale retort which was the subject of a discussion between his father and Steve Moss, an old and respected pioneer⁹ of the area. Dalby remembers well the story Steve Moss told his father, but he has forgotten the names of the original owners of the retort and other factual data that would enable us to "pin down" the actual history of experimentation.

ONE BARREL PER DAY WAS PRODUCED FOR HARNESS OIL, ETC.

According to Dalby, Moss told Dalby's father that the retort was built by an old pioneer experimenter who extracted as much as a barrel of oil per day. This oil was used as a dressing for harnesses and other leather goods and also as a lubricant and as a source of light from wicks in crude lamps.

However, after examining carefully the reproduction of the photograph taken by Winchester, Dalby had serious doubts about the latter being a picture of the old retort he had seen as a boy. Dalby said that, as he remembered it, the old retort was built of native stone, not of brick, as shown in the Winchester photograph. However, since Hanson knew of the ruins of an old retort in Shale

⁹. Steve Moss was an older brother of Fred Moss (see Figure 8), the colorful, handsome, very talented, but tempestuous outlaw of this frontier region of early Utah. This Moss family were Danes whose name descended from an English soldier who married in Norway and moved to Denmark. The old residents of Levan who knew the Moss family trusted Steve as much as they feared Fred. Steve was not given to light stories. He had the reputation of telling only facts. "You could be sure it was true if Steve Moss said so!" Steve Moss was born in 1861. At '8 he married a girl from Levan and settled at Little Salt Creek just north of the old Pierce Ranch. According to his son, Dewey S. Moss, Steve's first love was prospecting. Dalby's father, and "a Mr. Yergensen" grub-staked him several times to prospect the area south and east of Levan, the character and history of which he came to know intimately. Four of his sons think they remember their father telling them of the old retort but their memories are too vague to quote as history.

Hollow, and since it was in Shale Hollow that Sylvester Pierce and Ernest Pierce had each done assessment work (described hereafter) on a shaft and tunnel, respectively, it was decided to visit the Shale Hollow site first.

At the Chase Ranch a conference was held with Roy Chase, who after viewing the Winchester photograph, offered the opinion that this was indeed the retort he had seen about 1930 when riding for cattle in the area. He said he did not remember having seen it when, as a boy, he was in the same area about 1912.

THE SCATTERED RETORT RUINS FOUND AND PHOTOGRAPHED

At Chase's Ranch our party was joined by Sylvester Pierce and Ernest Pierce, and together we visited Shale Hollow. We found and photographed the remains of the old retort featured by Winchester. There is no question about its identity. The cast-iron floor, headplate, and steel press screw, the scattered brick from the walls of the still shown in Winchester's picture, the old smoke stack, the knucklejoint of the pipes shown in Winchester's photograph, the steel hoops from the barrel used to collect the condensate, charred fragments of the barrel stays, broken fragments of the thick-walled glass tubing used as part of the conduits for the volatile liquids and gases were found either at the immediate site or a short distance down the ravine where floods and men had carried them. The sagebrush, scrub oak, and other vegetation shown in Winchester's picture fit exactly the flora of the location found and photographed by our party.

There remains now but to prove that the retort photographed by Winchester was built by Mormon pioneers and was used back as far as claimed by Winchester and Jenson for distilling oil from the kerogen shales of the Green River formation. This proof may never be found. The trail may be too cold; but the Mormons were record-keeping people, and it is entirely probable that buried in the old records of Juab County, the archives of the L. D. S. Church, or in the obscure entries of the pioneer issues of the Deseret News is a note which will give the background for this early adventure.

DALBY SUSPECTS MOONSHINERS HAVE "MUDDIED" THE TRAIL

After examining the scattered remains of the retort photographed by Winchester, Mr. Dalby continues to have misgivings about this retort being the same as the one he saw when a boy. He wonders if the "retort" photographed by Winchester might not have been an alcohol still built by "moonshiners" using the old prospect site



Figure 2. Looking south-southwest down Shale Hollow toward its junction with Chris's Creek. Back of Alan Dalby is an old camp site on a little flat grown over with desert sage and surrounded by Utah juniper and serviceberry bushes. In front of Dalby is the scar in the west bank of Shale Hollow made where the old roadway entered the bottom of the ravine.



Figure 3. Looking north up the bottom of the Shale Hollow ravine, Alma C. Dalby stands at foot of dip-slope to left. The oil shale (being examined by J. E. Hanson and the Dalby boys) outcrops along the east (right) bank of the ravine where it dips under the overlying cover.



Figure 4. Heavy cast-iron lid with press "eye" for screw press of old retort. This is a considerable distance down the ravine from the old retort site shown in figures 6 and 7. The lid was not carried by floods unless it was "rafted" on mud and debris. It is so heavy as to require two men to lift it. The men in the picture are (from the left) Richard Dalby, J. E. Hanson, Carl Dalby, and Alen Dalby.



Figure 5. J. E. Hanson, Alms C. Dalby, Carl Dalby, Richard Dalby, and Alen Dalby standing behind a $\frac{3}{4}$ inch thick x $2\frac{1}{2}$ feet x $3\frac{1}{2}$ feet cast iron plate. This probably represented the floor of the retort. Though separated from the round lid shown in figure 4, this rectangular plate was down stream from the old retort site which had not been discovered when this picture was taken.

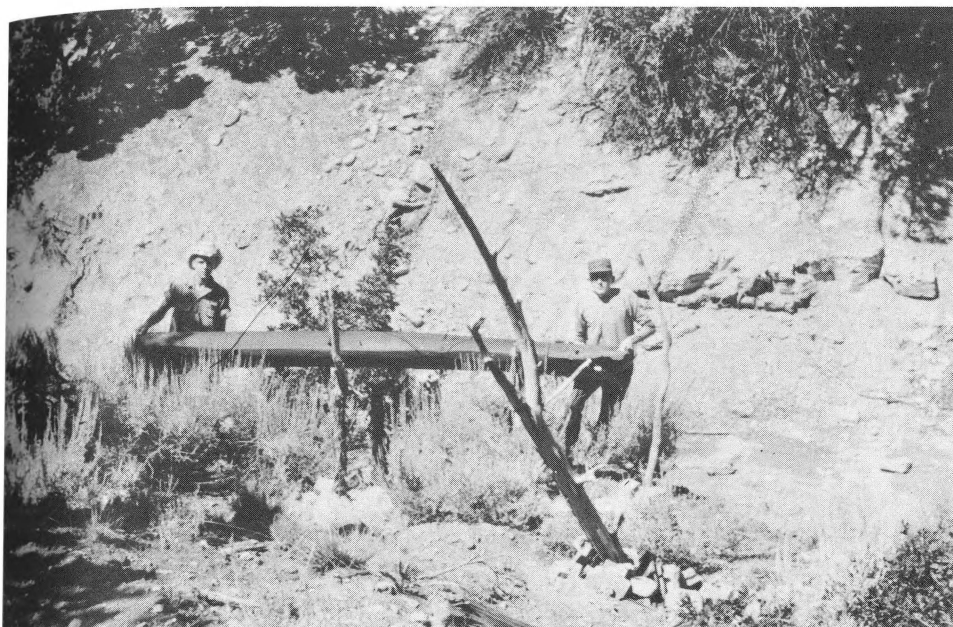


Figure 6. Carl Dalby (left) and Richard Dalby holding the rusted remains of the eight inch stove pipe stack of the old retort shown in the Frontispiece. This and figure 7 were taken at the real site of the old retort. Note the shaped brick at the foot of the cedar posts.



Figure 7. J. E. Hanson and Vests Pierce Crawford stand back of the press screw and pile of brick at the old retort site. Note the old steel barrel hoop hanging on juniper post.

on the oil shale claims as a camouflage for their activities, in case they needed an alibi if arrested by officers from the Department of Internal Revenue. Dalby does not question that there was an old Mormon oil shale retort nor that this old retort did produce oil as explained to him and his father by Steve Moss. He thinks that Winchester must have heard of this tradition from some local settler who knew of its history, but that Winchester was unable to verify this record with enough details to justify more than the bare statement already quoted from U. S. Geological Survey Bulletins 641 and 691. However, Dalby theorizes that Winchester might have found a "moonshine" still on the shale outcrop, and that if so, he would naturally have assumed that this was the pioneer retort he had heard about as belonging to an earlier generation.

If Dalby's "moonshine" theory were correct, it would explain why Roy Chase cannot remember seeing the retort when he visited the area about 1912. It also would explain why neither Sylvester Pierce nor Ernest Pierce can remember having seen the still when they did assessment work on the shaft and tunnel, respectively, as set forth hereafter.

FACTS NOT EXPLAINED BY THE "MOONSHINE" THEORY

If, however, when Winchester photographed the still in 1916, it was not more than 4 years old, how could it have appeared so ancient that an experienced investigator such as Winchester could not have readily recognized its recent origin? We would expect Winchester to have been suspicious that this still was far too new to have been constructed as far back as 1860. Furthermore, Winchester's field notes describing the still he photographed almost parallel the description of a common "D"-type still given by an authority¹⁰ on this subject. Apparently this type of oil shale retort was in common use for small-scale operations. Winchester was no novice; he had examined many primitive oil shale retorts throughout Utah and Colorado. He probably had seen various "moonshine" stills. Had this been built by "moonshiners," we would expect Winchester to have readily detected its true origin.

THE OIL SHALE ASSESSMENT SHAFT DUG BEFORE 1888

According to Sylvester Pierce, an 86-foot shaft was dug in Shale Hollow. The latter portion of this shaft was finished about 1888 by George W. Pierce, his older brother, with Sylvester's help when Sylvester was 15 years of age.

10. Beskerville, Charles, op. cit., p. 152.

SARAH PIERCE TRACED SHALE LOCATED BY INVALID HUSBAND

Sylvester Pierce claims that his mother, Sarah Pierce, discovered the oil shale float in Chris's Creek and that his father, George H. Pierce, son of Isaac Washington Pierce¹¹, traced this to its source in Shale Hollow and filed claims on the oil shale.

ETHER RUSSELL BOUGHT CONTROL AND SUNK A SHAFT

Later, George H. Pierce interested a man by the name of Ether Russell, an employee of the Salt Lake Tribune, in trying to help him develop the property. Russell is reported to have paid George H. Pierce \$200 for a 3/4 interest, Pierce retaining a 1/4 interest and the right to a royalty, the amount of which Sylvester does not remember. This happened when Sylvester Pierce was about seven years old.

11. This Isaac Washington Pierce joined the Mormon Church in 1833. He died in Illinois on December 28, 1841.

On an old survey plat of the Public Land Office, what is now Chase's Ranch is labeled under the name of Isaac Pierce. This is undoubtedly Isaac Washington Pierce, Jr., the son of the man who died in 1841, and the younger brother of George Henry Pierce, who developed the ranch, who filed on the oil shale claims, and whose sons and grandson dug a shaft and drove a tunnel in an effort to hold the mineral rights.

Because of the location of the old oil shale retort in Chris's Creek, because the water from Chris's Creek was used to develop the old Pierce Ranch (now owned by Roy Chase) and because the history of the oil shale enterprise was so intimately intertwined with that of the history of the Pierce family, the following pertinent facts concerning this family are here footnoted.

According to Andrew Jenson's L. D. S. Biographical Encyclopedia, volume 4, pages 44-57, Isaac Washington Pierce, Sr., had four sons, Amasa, George Henry, Nathan, and Isaac Washington, Jr., and a daughter, Lucy, who died in infancy during the mob violence of that period. His widow, Phoebe Baldwin Pierce, married Daily Carpenter and came West with three of her sons (Amasa had died previously), arriving in Salt Lake Valley October 6, 1852. In the spring of 1854 the family moved to Ogden.

However, according to L. D. S. Church records, the second son, George Henry Pierce, was living at Payson in 1854, at Nephi in 1860, and at Deseret (where his daughter, Phoebe, was born July 15) in 1861. In the meantime his first wife, Lucinda Ellsworth, had deserted him. By her he had fathered two sons, George Henry, Jr. (who died as a child), and Amasa. On April 6, 1859, he had married Sarah Skinner of Provo, Utah, taking her and his son, Amasa, first to Nephi and then to Deseret where his mother then lived. The Sevier River "bottoms" at this time were a series of lakes and marshes with luxuriant meadow grasses in great abundance. George Henry Pierce spent much time cutting this for hay and wading through the swamps to carry the hay to higher ground for curing. Probably as the result of this exposure to the killing waters, he contracted pneumonia and nearly died. He never fully recovered from this protracted illness. One of his lungs was tapped with a drain tube and finally collapsed, leaving him with a withered arm and such frail health that his family had to be supported almost entirely by his wife, Sarah.

It appears that Isaac (the fourth son of Isaac Washington, Sr.) went to Ogden with his mother's family in the spring of 1854; however, it is recorded that he later joined his brother, George Henry Pierce, at Payson (probably late in 1854, because Isaac there participated as a guard during the Walker Indian War.) On June 14, 1857, Isaac was at Fillmore, Utah (where it is recorded that he was ordained a "Seventy" by Hyrum Mace), and became a pioneer settler of what is now Deseret in the spring of 1858. His mother was (according to the above reference from Andrew Jenson, p. 45) "the first white woman settler in Deseret."

Isaac, in the spring of 1862, crossed the Plains as a teamster going from Utah to the Missouri River to meet the L. D. S. emigrants. It was on this trip that he met the Carlson sisters, Hannah and Elna. Hannah, he married May 4, 1863. On January 22, 1864, Hannah died and was buried at Fillmore. On March 27, 1864, Isaac married Elna. Isaac's mother had by Carpenter two or more daughters and a twin boy who died in infancy. Mrs. Carpenter died in Deseret, January 6, 1865, but was buried in Fillmore beside the remains of her son Isaac's first wife, Hannah.

While Isaac was a freighter he would have passed several times along that portion of the Old Spanish Trail now roughly followed by Highway 91 between the crossing of the Sevier River near the present U-B Dam and Nephi, Utah. It is presumed that he came to know of the retort in Shale Hollow, that he became impressed with the possibility of establishing a ranch at the mouth of Chris's Creek, and that he probably made some sort of claim for a squatter's right at this point, which might account for his name on the old survey plat above referred to.

In May, 1868, George Henry Pierce, moved to Levan from Deseret. Isaac Pierce is listed by his biographer as having settled in Levan in 1869. He thus, apparently followed his older brother, George Henry Pierce, who had preceded him a year earlier. The biographer of Isaac Pierce does not make any mention of Isaac's holdings on the old Pierce Ranch, and since Isaac moved to Glenwood in Sevier County in 1871, about the time that Sylvester Pierce says his father, George Henry Pierce, took possession of Pierce's Ranch, it is probable that, if, as indicated by the old survey plat, Isaac was, in fact, the original founder of this ranch at the mouth of Chris's Creek, he must have disposed of his interest to his older brother, George Henry Pierce, before leaving for Glenwood.

Ether Russell was a married man who associated himself with a partner in Salt Lake City by the name of Charlie Anderson, a bachelor who came from Salt Lake City and camped in Shale Hollow near the old shaft and worked the shaft quite deep before Sylvester first visited the property as a boy. "Anderson was a small fellow. He worked during about three seasons and would spend from two to three weeks at a time. Then he quit coming, and Russell, a man weighing about 150 pounds, medium tall, slender, and not in very good health, but an honest, square fellow¹² hired" George W. Pierce, Sylvester's older brother, to do the assessment work each year. George dug the shaft with Sylvester's help to turn the windlass. George and Sylvester deepened the shaft to 86 feet when they were flooded out with water. The deepest formation penetrated appeared the most promising. Oil collected on the water and was skimmed off and ignited.

ERNEST WYLER HAD OIL SHALE RELOCATED AND A TUNNEL DRIVEN.

Russell died about 1893 and was succeeded in interest by a man by the name of "Ern" Wyler, who did nothing further on the shaft, but hired Sylvester Pierce to post his relocation notices on January 1 of each year¹³ for several years until about 15 years after Sylvester Pierce went to Flat Canyon, or about 1912.

Later, during the winters of 1915 and 1916, Ernest Pierce, Sylvester's son, who was then 15 to 16 years old, helped John Beemus of Gunnison extend an old tunnel into the east face of Shale Hollow near the old shaft. They were paid for this work by "Ern" Wyler.

OLD RETORT REMAINS EXAMINED SEPTEMBER 3, 1960

The scar on the east side of Shale Hollow presumed to have been caused by the cave-in of the old tunnel was found when our party visited Shale Hollow, September 3, 1960. Ernest Pierce, who helped do the last work on the tunnel came part way with us, but was under doctor's orders to avoid overexertion. Therefore, neither he nor his aged father, who helped with the shaft sunk during the "eighties", could accompany our party beyond the lower camp site. However, the rest of us continued up Shale Hollow to the above-mentioned scar marking the tunnel site and beyond to the site of the retort photographed by Winchester. The shale formation dips to the east and outcrops intermittently along the east bank of Shale Hollow (see figure 3). Floods down the wash must have completely filled the old shaft.

12. Oral statement of Sylvester Pierce.

13. Between 1880 and 1921 the assessment year corresponded to the calendar year.

NEITHER ROBINSON NOR THE PIERCES REMEMBER THE RETORT--WHY?

Sylvester Pierce does not recall having seen the old shale retort when he was helping his brother George dig the shaft, nor does Ernest Pierce recall having seen it a generation later when Ernest was helping John Beemus drive the tunnel. Neither does Heath M. Robinson¹⁴ remember having seen the retort in 1914 when he collected the samples from Locality No. 1, shown on his map for U. S. Geological Survey Bulletin 641. But it is possible that none of them went so far up Shale Hollow as the site of the old retort. They did not know of its existence and would have had no occasion to explore Shale Hollow above the old shaft. The retort ruins were not conspicuous. Had one not known what to look for, the ruins might easily have been passed by unnoticed.

Propsecting and development are well authenticated during the later stages. The early history is left largely to surmise. Until more research is done and facts to the contrary are brought to light, the following explanation is placed on record as background for reference purposes.

HISTORY POSTULATED FROM CIRCUMSTANTIAL EVIDENCE

When the early Mormon immigrants came to Utah, the old Mormon trail led them near an oil seep in southern Wyoming, where it is said they were able to collect oil residues to lubricate their wagon hubs. The tradition of this occurrence probably persisted among the early immigrants and kept them alert for some local source of oil near the Utah settlements.

THE RETORT WAS OLDER THAN ADJACENT SETTLEMENTS.

There was no settlement near our pioneer retort site either at Levan or Chicken Creek¹⁵ until after the settlement of Nephi¹⁶, Manti¹⁷, Ephraim, and the discovery of coal at what later became Wales. As early as December 20, 1849, "Lieutenant Gunnison¹⁸ reported that there was a

14. Written communication to Arthur L. Crawford.

15. McCune, Alice Paxman, The History of Juab County, p. 151.

16. Neff, Andrew L., 1940, History of Utah, 1847 to 1869, p. 209.

17. Settled November 22, 1849, "These Our Fathers, a Centennial History of Sanpete County, 1849-1947", page 21.

18. L. D. S. Journal History, December 20, 1849. (John W. Gunnison, then a member of the Stansbury Expedition; later as Captain Gunnison he was chief of the surveying party massacred by the Indians, October 26, 1853, near Oasis, Utah.)

Other entries in the L. D. S. Journal History showing the interest of the pioneers in coal as soon as settlement was well under way are:

December 7, 1848, crediting Hosea Stout with finding "symptoms of coal a quarter of a mile above Warm Springs."

January 30, 1850, noting that Dr. Blake was doing "some work on coal from Sanpete Valley." (Dr. Wm. P. Blake was the surgeon attached to Stansbury's expedition, but he was also a chemist and geologist.)

19. Neff, *op. cit.*, p. 208. (See also Winn, Eden Loris, ab. 1955, "Development of Utah's Coal Mining Industry, 1850-1900"; Brigham Young University unfinished Master's degree thesis.)

20. Neff, *ibid.*, (April 9, 1865), p. 399

splendid vein of coal" in the region between Manti and Salt Lake City. By 1851 coal had been discovered at Coal Creek¹⁹ at the southern rim of the Great Basin, and iron ore was already being investigated. But the oil shale that gave rise to the pioneer retort was probably not known until after the end of the Walker War in 1854. There are strong reasons for believing that its discovery antedates the outbreak of the Black Hawk War²⁰. The stage was set for the oil shale discovery and the building of the retort immediately following the Walker War.

THE PERTINENCE OF THE WALKER WAR

Since July 17, 1853, when James Ivie²¹ interfered with a Ute Indian's abuse of his squaw at Springville, Chief Walker had plagued Central Utah with relentless war. All of the ranchers and villagers of the state sought the protection of improvised forts in the larger communities. Many lost their lives. But, by November 28, 1853, Walker's younger brother, Ammon, arrived at Parowan²² to sue for peace. An armistice was concluded and a "Big Peace Smoke" promised in the spring to take place at Chicken Creek, when President Young would come south. The "Big Smoke"²³ was begun May 11,

21. Neff, *ibid.*, p. 372.

22. See Journal History under date of December 8, 1853.

23. See Journal History under dates of May 11 and 12, 1854. For further details, see Neff, *op. cit.*, p. 379-381, and Bailey, Paul, 1954, "Walkara, Hawk of the Mountains", p. 148. To prepare for the "Peace Smoke", President Young had sought to propitiate Walker with presents and messages of good will, dispatched from Salt Creek with George W. Bean and Orrin Porter Rockwell, his two emissaries most experienced with Walker's unpredictable temperament. Together, this team had brewed a "near scalping" by Walker's party on the Provo in May 1849. Together, they, with others, had in April 1854, taken presents from Brigham Young, and treated with Walker at Beaver Creek. They were told by President Young to keep "Chief Walker in hand and peaceable for a year, if it cost the Church \$10,000." (See Horne, *Florida B. Bean*, compiler in 1945 of the "Autobiography of George W. Bean and his family record", p. 94.)

According to Bailey, on arrival at Chicken Creek, President Young made the mistake of sending word to Walker that he had arrived and was ready to meet with him in his carriage. Walker considered this a serious breach of protocol and sent word that Walker would be waiting in his camp if Young wished to see him. Then, when President Young went to Walker's camp, the President was informed that Walker "did not have the Spirit" and would need more time. After being subjected to a further series of delaying tactics, President Young was finally able to get Walker to set the date ahead one week. President Young with his party then went on to Fillmore, attended to his Church and state affairs, and returned with Chiefs Kanosh and Pootestneet and lesser dignitaries for the "Big Smoke". I have not found proof that any such week of postponement was ever agreed to or that some of the other claims made by Bailey have a basis in fact.

According to Bean's Autobiography (cited above, p. 94-95), however, there was no trip to Fillmore and return, but "the Elders administered to the (Walker) child and it got better, so that Walker decided to go with us next morning as far south as New Harmony, Iron County, which took 15 days or more. Being in good company had a good effect upon him." Since Bean was one of the interpreters and a principal "go between" throughout these negotiations, it would seem that his record of eye-witness events should be read with confidence.

Walker did not leave at once with Brigham Young's party, but at the Sevier River Crossing on May 12, "at 5 o'clock, p.m., Daniel H. Wells, Orrin Porter Rockwell, and those who were left to trade with the Indians arrived with Walker" (L. D. S. Journal History, May 12, 1854). Subsequent entries in the Journal History show conclusively that Walker was with Brigham Young at Cove Creek and indicate that he went as far south as New Harmony as claimed by Bean. On its return, Brigham Young's entourage camped on the south bank of the Sevier River the night of May 25th. High water in the Sevier River made the crossing difficult. After rafting the river on May 26th, "We had a heavy shower which watered the road, making it heavy dragging to Nephi, where we arrived at 2 o'clock p.m...." No mention is made of a stop to continue the "Peace Smoke" and the time schedule recorded seems to rule out such a possibility. Apparently Brigham Young believed that Mormon kindness, firmness, dignity, and consistency would need time to impress themselves on the undisciplined Indians, and that there was little point in continuing to try to achieve an elaborate treaty.

Interesting in this connection is the following quoted from a speech by Brigham Young, December 3, 1854, delivered in the Mormon Tabernacle in Salt Lake City:

"There are many in this city who can bear witness to an incident

"There are many in this city who can bear witness to an incident I will now relate. Last spring when we visited Walker, the Indian Chief, he was dull and sulky and lay in his tent, and would not come out to meet me. I went into his tent, and the first thing he said was "Brother Brigham, lay your hands upon me, for my spirit has gone away from me, and I want it to come back again." He was full of anger, for his people had been fighting, and he did not know whether to turn on the side of peace or war.

"We laid hands upon him and he felt better. At his request we sung some "Mormon" hymns, and, as we left his tent, he was full of the good spirit, and would not injure this people, no, not one particular. He travelled with us to Iron County and had dreams which amounted to revelations..."

1854; but it was not until mid-summer that events showed that the Walker War was over. On January 29, 1855, Walker died²⁴ and was succeeded by his brother, Chief Arrapeen²⁵.

The year of the Walker War had disrupted progress in the smaller settlements. Building and exploration had been greatly hindered. Natural resource development had to be postponed in the interest of community defense. With the close of the war, the pent-up urge to get on with the colonization program made itself manifest. At no other time did mining receive such official Mormon sanction.

THE DISCOVERY OF COAL AT WALES--A LOGICAL PRELUDE

There was a "boom" atmosphere, when on Sunday, October 15, 1854, in the Old Bowery at Fort Ephraim, "Brigham Young preached a sermon. Chief Arrapeen came and had an interview with the governor, giving him a regular hugging!" During the conference in the Bowery, an Indian, Tabiona, arose, held a piece of coal above his head and exclaimed, "Heap burn!" This dramatic story and the account of how John F. Rees and John Price (two Welch coal miners) were sent with Tabiona by Brigham Young to make the first white-man discovery of coal at Coalbed (later named Wales) is recorded in a manuscript dictated in 1924 for the L. D. S. Historian's Office by Dr. T. D. Rees. It is on file in the L. D. S. Archives and is probably the source of the account given in *These Our Fathers*²⁷ and most of the accounts that have been written since 1924.

Although the coal at "Coalbed" was not the first to be discovered in Utah, its nearness to the Mormon centers, gave it special significance. In a speech²⁸ in Salt Lake City in May 1855, Brigham Young gave the people generally a preview of its importance.

24. This date of his death is that of Paul Bailey in his "Walkara, Hawk of the Mountains," p. 168-169. Bailey apparently takes as his authority the account recorded in L. D. S. Journal History under date of January 29, 1855. Andrew L. Neff, *op. cit.*, p. 382, gives Walker's death as January 25, 1855, and in "These Our Fathers", p. 28, January 20, 1855, is the date given for Walker's death, apparently following Bean's autobiography (Horne, *op. cit.*, p. 144). Bean, however, was not present and the date given by him may have been approximated years later.

25. There is no accepted spelling of this name. The one here used is that in Neff's "History of Utah."

26. L. D. S. Journal History, October 15, 1854.

27. *These Our Fathers*, a Centennial History of Sanpete County, 1849-1947, p. 211.

28. Journal of Discourses, v. 2, p. 281. Undoubtedly President Young had been "briefed" by the Welch coal miners; his discussion indicates clearly that most of his listeners had had little or no experience with fossil fuel.

The Welch converts to Mormondom were mostly coal miners with no experience that would fit them for the frontier on which they had cast their lot. When news of the discovery of Coalbed reached the contingent at Spanish Fork, where a number of Welchmen had gathered around a Welch sponsor who had been a missionary to Wales, one of the immigrants is reported²⁹ to have said, "Now we are in business. We can live!" They flocked to Coalbed and it became known as "Wales".

THE NEED FOR A SHORTER HAUL

As in any boom town founded on a new mineral discovery, there was always the possibility of finding a bigger and better deposit, possibly more favorably located. Wales was on the back (east) of what is now called the Gunnison Plateau. To the west lay the Old Spanish Trail, which had already become the well-beaten road between Salt Lake City and Fillmore (the new capital for Deseret). If coal could be found on the west side of the plateau, transportation to better markets would be shorter, much easier, and cheaper. With this in mind, it is assumed that prospecting was pushed up the east side and over the top of the plateau. Coal beds that gave promise were found higher up. Associated with the coal were shaly and limy beds that would burn if properly ignited and ventilated. The prospecters found bituminous shales not unlike the Scottish shales from which kerosene was then being extracted as the best known source of a mineral substitute for animal fats for grease and lighting purposes.

Some among these early Celtic pioneers at Wales, Utah, were familiar with the primitive oil shale retorting industry in Scotland. One of them probably came over the plateau westward to Chief Walker's old camp and to what was later the old Mormon settlement of Chicken Creek, near Juab Station of a later period. Reason tells us that it was such a man who found and recognized the similarity of the shale in Chris's Creek to the oil shale then well known as source rock for petroleum in Scotland. He could easily have been a Scotchman. There were many Scotch converts among the Mormon settlers. But he might have been a Welchman familiar with oil shale technology. Whoever he was, he experimented with and found this material to be rich in bituminous matter. The first experiment would not have been difficult. In fact, Dalby tells of a crude experiment of his father, who brought some of this shale and put it in his mother's stove and nearly set the house afire.

29. Oral communication from Dr. D. G. Edmonds.

THE "OLD SCOTCHMAN" WHO TAUGHT JENSON THE ART

The story of J. B. Jenson tends to corroborate the sequence of events here postulated. He says in his booklet reprinted from the Salt Lake Mining Review:

"My first work, personally in connection with our American shales, was undertaken early in 1902 when an old Scotch retort man came into my office bringing samples of shale from Tucker, Utah, with a wonderful story as to the possibilities of producing kerosene direct from shale in this country as was being done in Scotland. Gasoline was then a by-product, somewhat of a drug on the market and had but little value. The enthusiasm of the old gentleman, together with actual demonstration in a small impromptu retort of the production of oil from shale, had its effect upon me and I entered into arrangements with him, whereby we would build a Scotch-type retort of sufficient size to demonstrate the practicability of the undertaking."

TRADITION OF RETORT RETOLD (?) BY FREIGHTERS

Had the retort been constructed after the settlement of Chicken Creek, Levan, or Pierce's Ranch (at the mouth of Chris's Creek) a novelty of such far-reaching significance to freighters, and ranchers alike, in need of "harness oil" would presumably have found mention in one of the contemporary diaries. Since no such mention can be found any nearby settlements were probably subsequent to the building of the retort and its tradition was probably retold by some of the freighters who had passed along the Old Spanish Trail while the retort was in operation during the early Mormon period. Circumstantial evidence points to Isaac Pierce (see footnote no. 11) who probably was influenced by the assumed economic possibilities of the oil shale in locating a ranch adjacent to it. Isaac would be expected to pass his information on to his invalid brother, George, and to George's wife Sarah³⁰, when he negotiated with them to take over his ranch.

JOHNSTON'S ARMY CREATED A MARKET

Johnston's army is known³¹ to have sent heavy commissary wagons to Wales for blacksmith's coal. The

30. Sarah was a matriarch of Southern lineage, who in support of her invalid husband and large family, made of the Pierce ranch an oasis in the desert--a supply station for freighters, stockmen, and California emigrants. By her ingenuity, industry, and final success in establishing this freighters' supply station, Sarah showed that she had the vision necessary to have wanted to add harness oil and axle grease to her supplies for her clientele.

31. Rees, Dr. T. D., "The Pioneer Coal Miner tells the story of the First Coal Mine west of the Missouri." This manuscript was reported to have been published in an Australian Newspaper while Doctor Rees was U. D. S. Mission President in Australia.

incentive for shortening the haul by finding coal near the main road west of the Gunnison Plateau and for distilling oil for harness dressing would have been greatest while Johnston's Army occupied Camp Floyd.

THE RETORT PROBABLY BUILT BETWEEN 1855 AND 1859

If, as claimed by Winchester and Jensen, the retort antedated the discovery of oil in Pennsylvania, its construction could not have been later than 1859. We can be quite sure that no pioneer would have tended a retort at such an isolated place during the Black Hawk War (1865-1868). Many of the ranchers east and north of this site were scalped as soon as the Indians became hostile. The owner of the retort might have suffered the same fate. If he was operating his retort at the outbreak of the Black Hawk War and escaped the Indians, he is presumed to have abandoned his enterprise never to have returned. Consequently, it is confidently assumed that the retort was constructed during the years between the Walker and the Black Hawk Indian Wars (1854 to 1865)--probably between 1855 and 1859.

THE U.S.G.S. PUBLISHED ON THE OIL SHALE AT CHRIS'S CREEK

The tradition of the retort's existence must have come down from the freighters and persisted among a few of the local settlers at the time Winchester in September 1916 visited the area. It was then that he took his Sample No. 186 (an analysis of which is given hereafter) that was reported on page 55 of U. S. Geological Survey Bulletin 691 (and in the tabulation appended). It was then that he took the photograph that became Plate XI of the same bulletin.

H. M. Robinson, a 24-year-old geologic assistant of Winchester had visited and sampled the area 2 years earlier and made it Locality 1, sample no. 1, in the report on page 152 of Winchester's earlier bulletin³². Robinson's Locality "3" was near Tucker, from which came the first oil shale brought to J. B. Jensen by the "old Scotch Retortman." Jensen may have obtained his story of the pioneer retort from the "old Scotch retortman" and told it to Heath M. Robinson, who passed it on to Winchester.

It appears from various statements made by J. B. Jensen, in his five articles reprinted from the Salt Lake Mining Review that there were two periods in which he gave intensive study to the distillation of "shale" from oil shale. These were from 1902 to 1905, and from

32. U. S. Geological Survey Bulletin 641.

1916 to the publication of his articles in 1921. The data concerning the section sampled by Winchester is paraphrased from the published account in U. S. Geological Survey Bulletin 691, page 55:

Sample No. 186 (Results of Distillation)
 Oil Shale Collected in Chris's Creek, Juab County, Utah
 by Dean E. Winchester, September 1916

Oil: gallons per ton..... 22
 specific gravity..... 0.893
 Ammonium sulfate: pounds per ton. 2.57

Section at mouth of old tunnel³³
 in Chris's Canyon, southeast of Juab, Utah

Shale, green, barren.....	1	0
Sandstone.....	1	6
Shale, green, barren.....		10
Sandstone.....	1	8
Shale, thin-bedded, yellow.....	1	2
Sandstone.....		10
Shale (as good as Sample 186).....	3	6
Shale, lean.....	3	4
Shale, rich (Sample 186; 22 gals.)....	2	3
Total of Measured Section.....	16	1
Shale, lean (unmeasured)		

NATION-WIDE CHECKUP INDICATES RETORT WAS GENUINE

I have checked with Russell Anderson, geologist for the Kennecott Copper Corporation, and with everyone I could find whom I thought would have reason to know the difference between an experimental oil shale retort and a "moonshine" whisky still. Mr. Anderson has examined numerous "moonshine" stills collected by the Internal Revenue officers in prohibition days in and about Bingham Canyon. Anderson feels sure the Chris's Creek still was, in fact, an oil shale retort.

Donald E. Madsen, Investigator, Alcohol and Tobacco Tax Division of the U. S. Bureau of Internal Revenue has been kind enough to circulate Winchester's photograph throughout the branches of the Bureau, after which he concludes that the object photographed "is undoubtedly exactly what you initially believed it to be...a shale retort... This picture...was given wide circulation...The Atlanta region, our largest productive office in still seizures, reports that...all personnel are completely unfamiliar with this type of still. Frankly I would prefer to think that the illicit liquor industry is concerned with a more mobile unit."

33. This is undoubtedly the old tunnel extended during the winters of 1915 and 1916 by John Beemus and Ernest Pierce.

HISTORICAL SIGNIFICANCE

If the retort was over fifty years old in 1921 as claimed by Jenson, it is older than any experimental oil shale retort I have been able to find of record in Utah. If it goes back prior to the discovery of petroleum in the Drake Well of Pennsylvania in 1859 (as the circumstantial evidence here deduced would seem to indicate), it certainly represents a rare bit of historical evidence of interest to us in Utah and of significance in any discussion of the petroleum industry of our state.

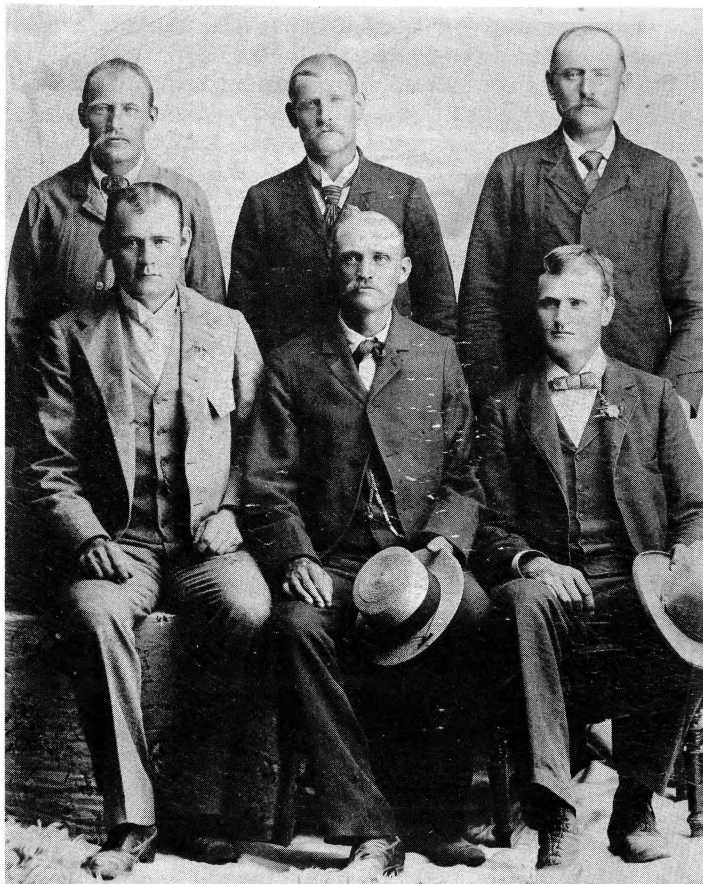


Figure 8. Six of the Danish Moss brothers of Levan.
(Left to Right)
Standing: Stephen, James Franklin, Jacob Peter.
Sitting: Fredrick Christen, Martin, Hyrum William.

It was Steve who told Alma Dalby and his father the story of the "old retort," the subject of this Circular. Steve (see footnote no. 9) was still alive at Segurd Utah, when Winchester visited Utah and photographed (see Frontispiece) the old retort. Steve could have been the source for Winchester's information recorded in U. S. Geological Survey Bulletins 641 and 691.

As this goes to press, the author has just been informed that about 1893 Fred Moss operated a brick kiln about $\frac{1}{2}$ mile west and $\frac{1}{2}$ mile south of the ranch houses at "Little Salt Creek." This would have been a convenient source of the brick for the "retort" had the latter been constructed after that date, as believed by Sylvester Pierce. Comparative analyses of these brick might throw some light on this point.

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