Denver Law Review

Volume 43
Issue 1 *Symposium - Oil Shale*

Article 6

April 2021

Water for Oil Shale Development

Robert Delaney

Water for Oil Shale Development

By Robert Delaney*

Before a shale oil industry can become a reality, a firm and dependable supply of water must be developed. No process yet devised can function without the use of considerable quantities of water. If not in the mining, then certainly water is required in the necessary refining and processing required for the movement of shale oil through pipelines or by other means. The quantity of water required for industrial use varies according to the process being considered. Some processes involving mining and a minimum of refining after extraction require relatively small quantities of water. If the products are refined to the point of use at or near the site of mining, then a much greater supply of water will be required. If the in situ process of retorting, utilizing steam, should be employed, then obviously an enormous amount of water would be necessary.†

Apart from water required for removal, refining and processing of shale oil, the industry will require many people. A common estimate is that for each individual directly engaged in the shale oil industry, there will be five persons resident in the area. Using another common estimate of one-fourth of an acre foot of water per year per person, a large amount of potable water with low mineral content must be developed suitable for domestic use.[1]

Assuming the area of water use to be in proximity with the oil shale deposits along the northerly side of the Colorado River from Rifle, westerly and extending northerly into the Piceance Basin, the source of water must necessarily be the Colorado River and the White River, with their tributaries, together with a limited ground water possibility of uncertain potential.

The water demand may be expected to increase proportionately as the shale oil industry develops; likewise, since shale oil technology is developing from experimental processes to prototype plants, and may be expected to proceed into full scale commercial production,

---

*Partner, Delaney & Balcomb, Glenwood Springs, Colo.; member, Colorado and American Bar Associations; LL.B., Westminster Law School, 1946.

†Editor's Note: Space does not permit detailed attribution of technical data related to mining and refining processes involved in the production of kerogen. For a brief and lucid technical reference work, see East, *Oil-Shale Mining, Rifle, Colo., 1944-56* (U. S. Bureau of Mines Bull. 611, 1964).

[1] The Mineral Resources Board of the State of Colorado in 1961 estimated that a shale oil production of 1,000,000 barrels per day in western Colorado would require development of a new metropolitan area of 340,000 people, with some 59,130 residents directly employed in the shale oil industry. Mineral Resources of Colorado, First Sequel (1960), 458.

water requirements should have a corresponding gradual increase. Many indulge in the fallacious assumption that the development of firm water supplies to meet the potential demand may be deferred until technology and other conditions launch the industry.

To date, there has been little cooperative planning or unified action by the oil shale interests toward developing water supplies required for a major industry. It is surprising that several of the major oil companies, while expending millions of dollars for the acquisition of oil shale deposits, have failed to take even a second look at water requirements obviously necessary for the development of those deposits. It is more surprising that the United States, with the Naval Oil Shale reserves, the vast amounts of oil shale under control of the Bureau of Land Management, the money spent through the Bureau of Mines on the oil shale demonstration plant with a declared interest in being a major participant in the oil shale program has not taken an active role in studies and planning for water supplies to meet the requirements of the industry.[2]

If this water supply euphoria continues, the day will almost certainly come when oil shale developers will find themselves seriously handicapped or curtailed by lack of water and at a serious disadvantage with their more farsighted competitors who are now actively engaged in developing supplies of water to keep pace with the development of the industry. The water that could be developed to support a major oil shale industry is subject to the intense competition for water from the Colorado River, and oil shale is in danger of losing by default.

The water supply problem has been recognized from the beginning of major planning on oil shale development. In 1953 a state financed study was made under direction of the Colorado Water Conservation Board to determine present and potential water requirements in Western Colorado in an attempt to secure agreement about transmountain diversions.[3] In the course of these studies, an excellent committeee comprised of the best engineers, hydrologists, and other persons obtainable, including representatives of most of the major oil companies, then interested in the area, conducted intensive studies concerning oil shale industry water requirements, and concluded that for a two million barrel per day operation a diversion or stream withdrawal of 625 cubic feet of water per second of time, or 455,000 acre feet of water per year, would be required.[4]

---

[2] While some 31,000 acres of Piceance Creek lands in shale-bearing areas are in Naval Reserves 1 and 3, over 200,000 acres are privately held. *Id.* at 451.

[3] Colorado Conference Committee & Colorado Water Conservation Board, Water Requirements of an Oil Shale Industry, Sept. 24, 1953.

[4] *Id.* at 4.

This would involve a net consumptive use of 400 cubic feet of water per second, or 290,000 acre feet per year with a return flow to the stream of 225 cubic feet of water per second, or 165,000 acre feet per year. It was further stated in their report that:

> A large scale oil shale operation will require water at essentially a constant rate throughout the year . . . .[5]
>
> From available hydrographic data, it seems evident that the only practical and economic source of water to a shale oil industry is the Colorado River, and its tributaries, in and upstream from the oil shale area. It also seems apparent that storage reservoirs will be required to assure a continuous water supply to an oil shale industry of 625 cubic feet per second.
>
> The industry hopes that the report of the Conference Committee to the Colorado Water Conservation Board, and, in turn, the Board's report to the General Assembly of the State of Colorado will show:
>
> (1) that a potential oil shale development in Western Colorado will require an estimated 625 cubic feet per second of Colorado River Water,
>
> (2) whether 625 cubic feet per second of Colorado River Water will be available to a shale oil industry,
>
> (3) what storage will be required to assure the availability of this amount of water,
>
> (4) how the financing, construction and operation of such storage facilities can most appropriately be handled and,
>
> (5) the availability of reservoir site or sites, which will be required for storage purposes, to assure a continuous water supply to an oil shale industry of 625 cubic feet per second.[6]

In the course of the same studies, a report was written and published entitled: "Report on Depletion of Surface Water Supplies of Colorado West of Continental Divide." Mr. Raymond Hill, an eminent engineer and hydrologist of the firm of Leeds, Hill and Jewett of Los Angeles was the author of the report, which was compiled after months of study and investigation at a cost of nearly fifty thousand dollars. The report is recommended reading to anyone interested in water supplies from the Colorado River or its tributaries. It is stated in the report that:

> Development of the oil shale reserves in Western Colorado should be anticipated and the consumption of water for industrial, municipal, and other purposes resulting therefrom may reach 300,000 acre feet per year.[7]

Importantly, it should be pointed out that this is a depletion, or consumed-use figure, and not a stream diversion figure with return flow.

---

[5] *Ibid.*

[6] *Ibid.*

[7] Leeds, Hill and Jewett, *Report on Depletion of Surface Water Supplies of Colorado West of Continental Divide* 59 (Bull. No. 1, Surface Water Series, Colorado Water Conservation Board, 1953).

The answer to the oil shale water supply problem rests with surmounting both natural and legal obstacles. There is a tremendous fluctuation in the flow of both the Colorado and White Rivers from day to day, from month to month, and from year to year. Most annual runoff occurs within a month or six weeks when the snow melts in the high mountains. In this short interval, water supplies exceed the present adjudicated demands. During the remainder of the irrigation season, in most years, the adjudicated demands exceed th supply, so that, on the Colorado River at least, releases from storage are necessary to satisfy the present irrigation and other adjudicated rights, without taking into account new uses for oil shale.

The answer to the problem, of course, rests in the construction of large storage reservoirs, at or above the points of diversion. These reservoirs must have capacity available not only for seasonal fluctuations, but also for cyclic variations to equalize flows between years of high runoff and those of drought. This situation was aptly described by Mr. Raymond Hill in the above mentioned report as follows:

> Under present conditions, very little water would be available during the irrigation season to satisfy the diversion requirements of industry. The natural flow of the rivers is already being used to its utmost to serve lands under irrigation, except during the winter months when the demand for water is insignificant and except during the period of snow melt when the rivers are in flood. Hence, conservation of flood flows by storage in reservoirs will be necessary to satisfy even a small industrial demand.
>
> The only existing reservoir which might be used for this purpose is Green Mountain Reservoir on Blue River constructed by the United States as part of the Colorado-Big Thompson Project. The diversion requirements of the oil shale industry itself might be satisfied by releases from this reservoir but the far greater requirements of the other industries could not so be met. The additional storage reservoirs which will be needed do not have to be located upstream from Rifle; on the contrary, there would be considerable advantage in having a large reservoir in the immediate vicinity of the potential industrial area.
>
> Opportunity exists for the creation of a suitable reservoir by construction of a dam in De Beque Canyon at the lower end of the valley within which the industrial development would presumably be centered. Diversion requirements of such industries could be satisfied by the withdrawal of water from the reservoir without regard to the inflow at the time. Return waters, except the very small proportion which might be unduly contaminated by chemical processes, could be returned to the same reservoir without waste downstream. All irrigation requirements in the Grand Junction area could be satisfied, without conflict with any other use, by the release of water from the reservoir, and the average quality of the irrigation water would be somewhat improved over that now available in the summer months.

> It is recognized that the cost of construction of such a storage project would be large, primarily because of the necessity of relocating the trunk highway and railroad which now follow Colorado River. This cost, however, would be insignificant in comparison to the tremendous capital investment which must be made to industrialize the region and which will not be made until there is assurance of ample water.[8]

As to the availability of stored water, it should be recognized that there is very little water available from the Green Mountain Reservoir for industry or shale oil. This reservoir on the Blue River, with a capacity of about 152,000 acre feet, has 52,000 acre feet allocated to replacement purposes in order that other Colorado-Big Thompson facilities may divert their full allocated amounts for use in Eastern Colorado and 100,000 acre feet allocated for use in Western Colorado. Most of this 100,000 acre feet is already being used during dry years for agricultural and other existing uses that have priority over oil shale development under the provisions contained in Senate Document 80,[9] allocating this water. Interim contracts have been entered or negotiated in recent years for industrial water from Green Mountain Reservoir, but the limitations imposed by the Secretary of Interior under the requirements of Senate Document No. 80 are such that the water contracted for can only be counted on for interim use until it is needed for other preferred purposes. Thus, Green Mountain Reservoir will not be of substantial assistance in supplying stored water for shale oil development.

The other reservoirs on the headwaters of the Colorado River, including Shadow Mountain, Granby Reservoir, Grand Lake, Williams Fork Reservoir, and Dillon Reservoir, are all committed to uses in Eastern Colorado, and therefore will not be of assistance to a shale oil industry in Western Colorado.

The Ruedi Reservoir on the Fryingpan River, with an active capacity of 100,000 acre feet of water, is now under construction by the Bureau of Reclamation. Part of this water should be available for sale, for industrial or municipal use in the oil shale area, through purchase from the Secretary of Interior, acting through Region 7, Bureau of Reclamation, Denver, Colorado.

Water acquired from either the Green Mountain Reservoir, or the Ruedi Reservoir would be released to flow down the channel of the Colorado River, where an equivalent amount, less evaporation and seepage losses, could be pumped out, at or adjacent to, the points of use below Rifle, Colorado.

Probably the best source of oil shale industry water in the

---

[8] *Id.* at 49-50.

[9] S. Doc. No. 80, 75th Cong., 1st Sess. 3 (1937).

Colorado River drainage would be from the Crystal River. For several years the Bureau of Reclamation has had under study the West Divide project, contemplating one or more dams on the Crystal River with diversion by tunnels and canals for use along the southerly side of the Colorado River to a point approximately opposite DeBeque, Colorado. This water could be used to good advantage for municipal use and also for industrial use. The water thus developed would be of excellent quality, much better than that from the Colorado River. The weighted average concentration of dissolved solids in the Colorado River near DeBeque or Cameo is estimated at 387 parts per million, with 2,300 parts per million of suspended sediment, whereas, Crystal River water would be below 225 parts per million of dissolved solids, and below 220 parts per million of suspended sediment, according to the United States Geological Survey.[10]

As one of the projects entitled to participate in power revenues from the Basin Fund of the Upper Colorado Storage Project Act, the West Divide Project should have substantial financial assistance from the United States. What is needed primarily to get this project moving is a demonstration of interest and commitments for municipal and industrial water by oil shale owners and developers. Such interest should be manifested to the Bureau of Reclamation, Grand Junction, Colorado, or Salt Lake City, Utah. It appears probable that with an adequate municipal and industrial commitment, this project could be built so as to deliver water coincident with the needs of the shale oil industry.

The Colorado River Water Conservation District, Glenwood Springs, Colorado, has plans and conditional adjudication decrees for reservoirs that would provide water for part of the oil shale needs. Contractual commitments have been made, and additional commitments are obtainable for water to be delivered from these facilities when built. These reservoirs include the Iron Mountain Reservoir on the Eagle River, with storage capacity of approximately 50,000 acre feet, the Una Reservoir on the Colorado River between Rifle and DeBeque, with active projected capacity of about 170,000 acre feet and the White River Reservoir on the South Fork of the White River, with projected capacity of about 125,000 acre feet.

Some of the more realistic companies having shale oil interests have combined storage adjudications with direct flow adjudications from both the White River and the Colorado River. From the White River, these include both gravity diversion into the Piceance Basin,

[10] U. S. GEOLOGICAL SURVEY REPORT, MINERAL AND WATER RESOURCES OF COLORADO (1964).

and also pumping installations. From the Colorado River, plans are projected, according to adjudication claims, to pump water from the Colorado River over the Book Cliffs to the Piceance Creek Drainage area, which would appear to be an enormously expensive lift system. The direct flow claims, for which conditional adjudication decrees have been obtained from the Colorado River between Rifle and DeBeque exceed the entire flow of the River during some seasons. Many of these decrees optimistically obtained are probably abandoned for failure to show due diligence in putting the water adjudicated to a beneficial use. In several instances, the claimants have not offered proof of diligence in alternate years in the district court as required by statute.[11]

Direct flow adjudication decrees of this nature are of value to oil shale developers if properly obtained, entered, and maintained by reasonable diligence, with proof thereof offered in alternate years, because they reduce the quantity of water required to be obtained from storage. During periods of high seasonal runoff, water is available under such rights. Also, some winter flows are available for such rights during the non-irrigating season. These direct flow rights would also reduce the quantity of water required to be released from storage in order to guarantee a firm and dependable supply.

Steps taken by some oil shale owners toward obtaining water supplies seem to indicate a lack of definite or clear purpose, and a lack of basic understanding of what is involved in obtaining a firm water right available for industrial or municipal purposes. In several instances, ranches have been purchased with the intent at a subsequent date of converting their irrigation rights to the use of oil shale development. Such irrigation rights afford the owner the privilege of taking, according to his order of priority, a quantity of water for irrigation purposes. The irrigation season is from April to October. Irrigation rights, regardless of how early the priority, do not give the appropriator the right to divert winter flows for industrial or domestic use. Winter flows must be separately adjudicated and will be junior or inferior to all decrees previously entered in the same water district.[12]

In order to change the point of diversion from the headgate of the irrigation ditch to the place where it is to be diverted for oil shale purposes, it is necessary to obtain a decree from the district

---

[11] COLO. REV. STAT. § 148-10-8 (1963).

[12] See Greeley & Loveland Irr. Co. v. Farmers Pawnee Ditch Co., 58 Colo. 462, 146 Pac. 247 (1915); Colorado Milling & Elevator Co. v. Larimer & Weld Irr. Co., 26 Colo. 47, 56 Pac. 185 (1899); and COLO. REV. STAT. § 148-9-13(3) (1963).

court changing the point of diversion.[13] Such a decree will not be entered if the rights of other appropriators, including those junior or inferior to the applicants are adversely affected.[14] In some instances, the courts will decree a reduction in the amount that can be diverted in order that other appropriators will not be adversely affected and on that basis will authorize a change in point of diversion as to a portion of such right.[15] Conversely, a right once changed to a new point of diversion, cannot thereafter be taken from the old point of diversion without a similar statutory proceeding. Thus the lands previously purchased become largely valueless because of lack of water, and the water right moved to the new location may be of small value because of reduction in quantity to meet adverse claimants' objections and because of the limitation on the period when diversions can be permitted under an irrigation right.

Another serious problem in the purchase of rights with intent to transfer their points of use, arises in the case of an incorporated or mutual ditch company. It would appear doubtful whether the owner of water rights reflected by shares in a mutual ditch company could, without consent of the other owners having shares in such company, remove the water adjudicated to the company ditch to another point of diversion, regardless of whether the other shareholders were adversely affected.[16]

Yet another example arises from the fact that such claimants often fail to recognize that the direct flow adjudication right, whether for irrigation, domestic, or agricultural purposes does not give the owner the right to store the water so diverted.[17] By the same token, the right to store, properly adjudicated, affords the claimant the right in order of priority of filling the reservoir once in a season,[18] and cannot be used as a direct flow right.[19] A direct flow right does

---

[13] COLO. REV. STAT. §§ 148-9-22 to -25 (1963).

[14] COLO. REV. STAT. § 148-9-25(2) (1963). See DeHerrera v. Manassa Land & Irr. Co., 151 Colo. 528, 379 P.2d 405 (1963).

[15] COLO. REV. STAT. § 148-9-25(2) (1963). See Colorado Springs v. Yust, 126 Colo. 289, 249 P.2d 151 (1952).

[16] The question appears to depend on whether or not the by-laws of the ditch company restrict the right to transfer the water right. If there is such restriction, the shareholder may not transfer. Model Land and Irr. Co. v. Madsen, 87 Colo. 166, 285 Pac. 1100 (1930). However, in the absence of such restriction, the shareholder can change point of diversion subject to rights of other stockholders. Wadsworth Ditch Co. v. Brown, 39 Colo. 57, 88 Pac. 1060 (1907).

[17] Greeley & Loveland Irr. Co. v. Farmers Pawnee Ditch Co., 58 Colo. 462, 146 Pac. 247 (1915). *But see* Seven Lakes Res. Co. v. New Loveland & Greeley Irr. & Land Co., 40 Colo. 382, 93 Pac. 485 (1907), however, this latter decision has not been followed and was rejected in City & County of Denver v. Northern Colo. Water Conservancy Dist., 130 Colo. 375, 276 P.2d 992 (1954).

[18] Holbrook Irr. Dist. v. Ft. Lyon Canal Co., 84 Colo. 174, 269 Pac. 574 (1928).

[19] *Cf.* Cache La Poudre Res. Co. v. Water Supply & Storage Co., 25 Colo. 161, 53 Pac. 331 (1898).

not take precedence over a storage right, but the two are governed by the order of priority decreed by the court; that is, if the decree for the reservoir is senior in time and by administrative number, to the direct flow right, then the reservoir is entitled to one fill ahead of the direct flow right.[20]

In evaluating adjudicated water rights, prospective purchasers sometimes fail to distinguish between conditional and absolute decrees, and fail to recognize that where a decree is conditional, it can only be made absolute by proof in the district court that the conditional requirements have been met with due diligence. This is particularly important where a ditch may have been originally constructed to carry a full adjudicated capacity, but subsequently was allowed partially to deteriorate causing a reduced carrying capacity so that the amount that can be proven to be used is less than that conditionally decreed.

Also, where the duty of water is defined to require irrigation of a specified number of acres, proof of irrigation of that number of acres must be offered before the decree can be made absolute,[21] whereas, in the case of an absolute decree, the decreed water can be used on a greater or lesser or different acreage so long as the original point of diversion is maintained and the demands placed on the decree are not enlarged over those existing when the decree was rendered.[22]

Of course, if the decreed amount of water or a portion thereof has not been used for a long period of time, it may raise an inference of abandonment, and abandonment can be invoked on a proceeding to change the point of diversion.[23] In the same vein, a water right, after diversion from a public stream, being in the nature of real estate, can be lost by adverse possession.[24]

One very misleading impression can be gained by simply observing or measuring the quantity of water flowing at a given time, or on an annual basis, in either the Colorado or the White Rivers. The legal and administrative complexities, particularly on the Colorado River, are numerous, and are becoming even more so each year. Persons contemplating a direct flow diversion from the White River or the Colorado River, or contemplating storage on one or more of

---

[20] COLO. REV. STAT. § 148-5-1 (1963). See People *ex rel* Park Res. Co. v. Hinderlider, 98 Colo. 505, 57 P.2d 894 (1936).

[21] Arnold v. Roup, 61 Colo. 316, 157 Pac. 206 (1916); Drach v. Isola, 48 Colo. 134, 109 Pac. 749 (1910).

[22] Arnold v. Roup, 61 Colo. 316, 157 Pac. 206 (1916).

[23] Means v. Pratt, 138 Colo. 214, 331 P.2d 805 (1958); Arnold v. Roup, 61 Colo. 316, 157 Pac. 206 (1916).

[24] Mountain Meadow Ditch & Irr. Co. v. Park Ditch & Res. Co., 130 Colo. 537, 277 P.2d 527 (1954).

the tributaries to these rivers, would be well advised to first consult with the Division Engineer of the State Engineer's Office at Glenwood Springs, who supervises water administration on the Colorado River, and the Division Engineer at Steamboat Springs, who has supervision over the White River, pertaining to the method of administration and adjudicated demands against the streams.

Over sixty percent of the Colorado River water must be allowed to leave the state to satisfy compact commitments to other states.[25] Of the remaining water, senior decrees require that amounts adjudicated be allowed to reach their respective headgates. Thus, it is not the quantity of water used under a decree, but rather the amount permitted to be diverted that governs the administration of the stream. On the Colorado River, there is a substantial power adjudication below the oil shale area that must be met on a year-round basis, as well as other decrees calling for water in the winter months. A diversion in the oil shale area would not be permitted, except during high runoff, even where there was a substantial part of the water returned to the stream after use, unless enough stored water were added to make up the net depletion.

During the summer months, part of the water flowing in the Colorado River, particularly during dry years, is stored water released from the Green Mountain Reservoir to meet decreed rights below Rifle, particularly for the Grand Junction area.

Under the provisions of Senate Document No. 80, these releases, in addition to generating power at the Green Mountain Reservoir, are made to supplement the flows of the Colorado River so that irrigation and domestic needs within the Colorado River drainage can be met. Thus, a junior or inferior right on a side stream will be permitted to continue diverting for irrigation purposes, even when the natural flow of the river is insufficient to meet senior demands in the Grand Valley area, because these demands are made up or replaced from storage releases out of Green Mountain Reservoir. As mentioned above, oil shale requirements, while recognized as

[25] By Art. III(d) of the Colorado River Compact [COLO. REV. STAT. § 149-2-1 (1963)], the Upper Division states (Colorado, Wyoming, Utah, and New Mexico) cannot deplete flows at Lee Ferry below 75,000,000 acre feet in each ten year period. The average virgin flow at Lee Ferry for the period of 1896 to 1964 has been approximately 14,878,000 annually, of which Western Colorado provides about 71%, or approximately 10,500,000 acre feet annually. By the Upper Colorado River Basin Compact of 1948 [COLO. REV. STAT. § 149-8-1 (1963)], Colorado was apportioned 51.75% of the water allocated to the Upper Division, after an allowance from the Upper Division share of 50,000 acre feet annually to Arizona. If virgin flows permit the Upper Basin to deplete the stream by 7,500,000 acre feet annually, then Colorado would have approximately 3,855,375 acre feet annually. More recent and more realistic water supply estimates place the Upper Basin water supply at not more than 6,200,000 acre feet annually, of which Colorado would be allotted 3,182,625 acre feet annually.

permitted uses from Green Mountain, are not free uses, and are subordinated to the agriculture and municipal requirements within the Colorado River drainage.

Another variable arises from the fact that there are numerous conditional decrees committing water to future use, but not yet diverted, which when developed will take precedence over currently adjudicated appropriations. This is particularly significant in relation to conditional decrees for transmountain diversions where there will be no return flow to the river and the depletion is therefore equal to the diversion.

For the above and other reasons, the water supply and the net depletions above the oil shale area cannot be measured or determined with precision. When an oil shale water demand is defined with certainty, the supply must take into account the uncertainty and fluctuation of the river and the diversions therefrom for natural as well as legal and administrative reasons, and the supply available for diversion must be computed on an estimate with adequate storage to compensate for a considerable margin of error.

There are various storage possibilities on tributaries of the Colorado and the White Rivers, some of which are available for development. A private company undertaking to construct and utilize such storage should recognize that an on-channel reservoir is a major undertaking. It should be commenced only with the most careful investigation as to available water supply, as well as geological and other relevant conditions at the dam site and in the storage area. Other problems arise in providing the means of delivery to the place of use, land acquisition, and right-of-way, particularly if some portion of the reservoir will occupy federal lands. Plans for such a reservoir must be approved by the State Engineer[26] and for obvious reasons the standards of construction will be rigid, with a large measure of safety both in dam construction and in spillway capacity. It should, above all, be borne in mind that a builder of a reservoir is held to a higher standard of legal responsibility than in most other pursuits.[27] His duty is not limited to ordinary care or lack of simple negligence, but he is in fact practically an insuror. A corporation vulnerable to suit should probably consult Lloyds of London before beginning construction.

The moral of the story is that at this time it would behoove all the major oil shale interests and the United States to join forces to cooperate and initiate a program for major storage to keep pace with the rapidly developing technology of oil shale.

---

[26] COLO. REV. STAT. § 148-5-5 (1963).

[27] See, *e.g.*, COLO. REV. STAT. § 148-5-4 (1963).