



Project 2002

November 2, 2007



Mr. John E. Axelson, P.G.
State of Colorado
Oil and Gas Conservation Commission
1120 Lincoln Street, Suite 801
Denver, CO 80203

**Subject: Final O-Sand Subsurface Investigation and Limited Feasibility Study
Logan County, Colorado**

Dear Mr. Axelson,

URS is pleased to submit this letter report to the Colorado Oil and Gas Conservation Commission (COGCC) to document the recently conducted subsurface investigation and review of potential remediation options for the J-Sand and O-Sand/heavy oil sites located in Logan County, Colorado.

Specifically, URS conducted a subsurface investigation and evaluation of remedial technologies for the following J-Sand site and nine O-Sand sites:

- ARCO Sindt 4 (J-Sand site investigated due to proximity to the O-Sand sites listed below)
- Francis Parke
- Parke #1
- Whitaker 2
- Davis 1
- Duncan
- Segelke 1
- WE Dickinson 1 (URS/COGCC previously performed subsurface investigation)
- Arthur Sindt 4 (URS/COGCC not granted access to this site by land owner)
- Richerson 3 (URS/COGCC not granted access to this site by land owner)

Prior to evaluating technologies, URS reviewed historical information and conducted field activities to generally delineate the extent of impacted soils at each location. Field activities were conducted from May 21, 2007 to May 23, 2007. URS teamed with Gary Gardiner of Gardiner's Gophers to trench and bore in the areas known to have been used historically as earthen pits. Additionally, historic use information was provided by Mr. Gardiner, who had previously worked at some of the sites. The historical information and field observations were used to determine the general nature and extent of shallow hydrocarbon impacts.

URS Corporation
8181 East Tufts Avenue
Denver, CO 80237
Tel: 303.694.2770
Fax: 303.694.3946

Based on this information, URS prepared an abbreviated evaluation of potentially feasible remedial options for addressing the most significantly impacted areas. Five technologies evaluated for the site included:

- Technology 1: Selective Excavation with Transport to and Disposal at the Logan County Landfill
- Technology 2: Selective Excavation with Consolidation in Disposal Cell
- Technology 3: Selective Excavation with On-site Land Treatment
- Technology 4: Selective Excavation with Transport to a Local Asphalt Plant
- Technology 5: Selective Excavation with Thermal Desorption

These technologies were individually evaluated against three criteria (effectiveness, implementability, and cost) to determine the one best suited for implementation at the O-Sand sites. Technologies 1 and 4 involve the selective excavation and transport of the impacted soils off site. Technologies 3 and 5 involve the selective excavation of the impacted soils with on-site treatment. Technology 2 involves the selected excavation of the impacted soils with disposal at a selected location at the O-Sand site. Technology 1 (the selective excavation and disposal of impacted soils at the Logan County Landfill) was determined to have received the most favorable rating when evaluated against the three criteria mentioned above. The detailed evaluation of the technology evaluation is located in the following letter report.

SUMMARY OF INVESTIGATION ACTIVITIES

Prior to initiating field activities, URS obtained U.S. Geological Survey (USGS) aerial photographs for the locations included in this investigation. Aerial photographs for the years 1985 and 2005 were analyzed to identify potential pit locations, sizes, and changes over time.

Utility locates were performed at all accessible locations prior to subsurface activities. URS conducted the limited subsurface investigation utilizing drilling and trenching techniques to determine the extent of impacted soils at the historic pit locations. Impacted soils are associated with abandoned earthen production pits historically used for the storage of natural tar residues from exploration activities. A track-mounted Bobcat excavator was used for trench digging and a wheeled Bobcat with an auger was used for drilling shallow boreholes.

The Richerson 3 and Arthur Sindt 4 sites were not investigated during the site visit. Mr. Don Dickinson, owner of the Richerson 3, requested that URS not perform the limited subsurface investigation. Ms. Norma Dickinson, owner of the Arthur Sindt 4, could not be reached to obtain access prior to the field work. All other sites were available for subsurface evaluation. The WE Dickinson site had previously been evaluated by URS.

The investigation evaluated the extent of impacted soils at each location and provided information for the development of remediation technology alternatives. Approximate volumes of impacted soils were estimated based on information from historical permits and results of the subsurface evaluation. The following sections discuss field activities and observations at the investigated sites.

ARCO Sindt 4: This location was visited on May 21, 2007 and is shown in Figures 1 and 2. The pit permit application submitted to the COGCC on June 27, 1986 applied for the construction of a 132 feet x 125 feet x 10 feet pit. During the subsurface site investigation, 42 locations were examined to delineate the locations and extent of impacted soils from between ground surface to a

maximum depth of 5 feet below ground surface (bgs). Nine locations contained impacted soils between the ground surface to 5 feet bgs. Photographs taken at the site are provided in Appendix A and the pit application in Appendix B. The estimated volume of impacted soils is shown in Table 1.

Francis Parke: This location was visited on May 21, 2007 and is shown in Figures 1 and 3. A fenced area of approximately 167 foot x 56 foot was observed during the site visit. The fence was locked, preventing URS and Mr. Gardiner from investigating the site. Based on discussions with Mr. Gardiner, there were originally four waste pits on site with a combined dimension of 375 feet x 60 feet x 6 feet. This was confirmed by reviewing the pit permit application submitted to the COGCC dated November 19, 1971 and provided in Appendix C. Mr. Gardiner indicated that the total depth of the impacted soils might be 22 feet bgs based on previous activities at the site. Fifteen borings were drilled on site around the fenced pit and no impacted soils were discovered. The extent of impacted soils was estimated to be contained in the fenced area with a dimension of 56 feet x 167 feet x 22 feet. Photographs taken at the site are provided in Appendix A and the estimated volume of impacted soils is shown in Table 1.

Parke #1: This location was visited on May 22, 2007 and is shown in Figures 1 and 4. Seven borings were drilled during the site visit. Impacted soils were found in one boring from the surface to a depth of 2 feet bgs. A second location had impacted soils at the surface only. Photographs taken at the site are provided in Appendix A and the estimated volume of impacted soils is shown in Table 1.

Whitaker 2: This location was visited on May 23, 2007 and is shown in Figures 1 and 5. Two areas were examined during the site visit. In Area 1, 15 borings were drilled. In three borings, hydrocarbon impacted soils were encountered from the ground surface to approximately 8 feet bgs. In Area 2, eight borings were drilled and two trenches were dug. One boring and one trench contained hydrocarbon impacted soils between 2 feet and 10 feet bgs. Photographs taken at the site are provided in Appendix A and the estimated volume of impacted soils is shown in Table 1.

Davis 1: This location was visited on May 22, 2007 and is shown on Figures 1 and 6. The pit permit application for this location submitted to the COGCC on March 21, 1973 (Appendix D) stated that there were three waste pits on site with the following dimensions:

- Pit 1: 45 feet x 45 feet x 6 feet
- Pit 2: 100 feet x 75 feet x 6 feet
- Pit 3: 165 feet x 45 feet x 6 feet

A pit inspection conducted by COGCC on October 15, 1986 (Appendix D) stated that the pit dimensions were estimated as follows:

- Pit 1: 40 feet x 50 feet x 6 feet
- Pit 2: 40 feet x 80 feet x 6 feet
- Pit 3: 50 feet x 90 feet x 6 feet

Additionally, a skim pit was previously located on site and had the dimensions of 15 feet x 15 feet x 6 feet. Thirty-two borings were drilled on site. Eighteen contained no impacted soils, while the remaining 15 had hydrocarbon-impacted soils from the ground surface to approximately 7 feet bgs. Based on these borings, three areas of impacted soils were identified. Photographs taken at the site are located in Appendix A. The estimated volumes of impacted soils are shown in Table 1.

Duncan: This location was visited on May 23, 2007 and is shown in Figures 1 and 7. The pit permit application submitted to the COGCC on July 12, 1980 (Appendix E) applied for a 120 feet x 120 feet x 15 feet pit. Mr. Gardiner stated that the impacted soils from this pit were removed prior to URS subsurface investigation activities. Ten borings were drilled at this location and no impacted soil was discovered. Photographs taken at the site are provided in Appendix A.

Segelke 1: This location was visited on May 22, 2007 and is shown in Figures 1 and 8. The COGCC pit inspection form dated October 21, 1986 (Appendix F) stated that two evaporation pits and one skim pit were historically located on site. The evaporation pits had dimensions of 30 feet x 40 feet and 40 feet x 40 feet and the skim pit had dimensions of 10 feet x 10 feet. Eighteen boring locations were drilled to a depth of 9 feet. Seven borings contained hydrocarbon impacted soils at depths varying from 1 to 6 feet bgs. Photographs taken at the site are provided in Appendix A and the estimated volumes of impacted soils are shown in Table 1.

WE Dickenson: This location was visited on October 4, 2007 and is shown on Figures 1 and 9. The pit permit application submitted to the COGCC dated October 8, 1971 (Appendix G) stated that the waste pit on site was 200 feet x 200 feet x 6 feet. The design drawings submitted with the application stated that there were to be three operating pits contained in this area with the dimensions of:

- Pit 1: 50 feet x 100 feet x 6 feet
- Pit 2: 150 feet x 100 feet x 6 feet
- Pit 3: 200 feet x 100 feet x 6 feet

Forty boring/pit locations were investigated during the site visit. The pit was investigated from ground surface to depth of 8 to 10 feet bgs. Borings were drilled to a depth of 10 feet. Based on these investigated areas, it was estimated that approximately 3,500-5,000 yd³ of impacted soils were on site. Photographs taken at the site are provided in Appendix A and the estimated volumes of impacted soils are shown in Table 1.

Richerson 3: This location was not visited at the request of the land owner, but is shown on Figures 1 and 9. The pit permit application submitted to COGCC on October 29, 1971 (Appendix H) stated that two pits were located on site with the dimensions of 125 feet x 100 feet x 6 feet and 103 feet x 125 feet x 6 feet. These dimensions were used in the estimation of the extent of hydrocarbon impact. No photographs of the site were taken.

Arthur Sindt 4: This location was not visited because the landowner could not be reached to grant access. This location is shown on Figures 1 and 9. There is no pit information found for activities that occurred on site. COGCC records show that three spills occurred between 1988 to 1995 due to leaks in process lines (Appendix I). The site was inspected on September 19, 1991 by COGCC. A pit was discovered approximately 200 feet east of the production well and was filled with oil sand. A calf carcass was discovered in the pit and an electric fence was around the pit. A visit to the site in the Spring of 2005 found an area of impacted soil with dimensions of 30 feet by 20 feet. Photographs taken at the site are provided in Appendix A and the estimated volumes of impacted soils are shown in Table 1.

Estimation of Extent of Impacted Soils

The total volume of impacted soils for all evaluated locations was estimated at approximately 22,537 cubic yards (yd³). Based on discussions with Mr. Gardiner, the pits were constructed in a

wedge shape with the largest dimension at the ground surface and not a rectangular box as the permits suggest. Based on this information, URS reduced the estimated amount of impacted soils by approximately 50 percent (11,269 yd³) and 25 percent (5,634 yd³) as a means to provide an estimated range of amounts of impacted soils requiring treatment. Both volumes were used in estimation of cost for each technology evaluated.

REMEDIAL TECHNOLOGY FEASIBILITY EVALUATION

The purpose of the remedial technology feasibility evaluation is to review options for addressing areas where historical pit use has resulted in impacted soils. Although the pits have been abandoned, petroleum hydrocarbons have seeped to the surface over time at some of these sites. The limited evaluation process assesses the information allowing for the selection of an appropriate technology to mitigate the impacted soils.

TECHNOLOGY DEVELOPMENT AND SCREENING CRITERIA

The following limited technology evaluation developed and screened remedial approaches that were appropriate for treatment of the hydrocarbon-impacted soils found at the O-Sand sites. Evaluated technologies were selected in part based on guidance from the COGCC's 900 (Exploration and Production Waste Management) and 1000 (Reclamation Regulations) Series rules. Remedial approaches selected for evaluation include:

- Technology 1: Selective Excavation with Transport to and Disposal at the Logan County Landfill
- Technology 2: Selective Excavation with Consolidation in Disposal Cell
- Technology 3: Selective Excavation with On-site Land Treatment
- Technology 4: Selective Excavation with Transport to a Local Asphalt Plant
- Technology 5: Selective Excavation with Thermal Desorption

Screening of Technologies

To identify their appropriateness, the five selected technologies were evaluated against three screening criteria: effectiveness, implementability, and cost.

Effectiveness

This criterion addresses both the effectiveness of the remedial technology in relation to the location and amount of impacted soils. Effectiveness addresses the ability of the technology to achieve the remedial goals developed earlier and the timeliness to achieve these goals. Additionally, it addresses the protection of the community and site workers during and after application of the technology. This criterion addresses the potential for adverse environmental impacts that might result from implementation of the technology.

Implementability

This criterion addresses the technical and administrative feasibility of implementing each technology as well as the availability of the required services and equipment for implementation. Technical feasibility includes the understanding of potential difficulties that may occur in implementation of the technologies, the reliability of the technology, and ease in undertaking additional remedial actions if necessary in the future. Administrative feasibility addresses the activities required to coordinate with

regulatory, state, and local agencies as well as landowners to implement the technology. Evaluation of the availability of services and materials considers the availability for equipment, facilities, materials, and techniques to aid in implementation of the technology.

Cost

This criterion provides an estimate of costs associated with implementing a technology. Costing includes the amount required for activities associated with implementation of a technology. Costs were developed in present dollars for implementation of each technology. Costs were also developed on a unit volume basis as well as cost for total volume treatment to allow for the comparison.

SCREENING OF REMEDIAL APPROACHES

Technology 1: Selective Excavation with Transport to and Disposal at the Logan County Landfill

This technology involves the excavation and transportation of hydrocarbon-impacted soils off site. The Logan County Landfill has been identified as the nearest landfill potentially capable of accepting the soils. Heavy equipment will be used to selectively excavate impacted areas. Based on field observations, the impacted soils are not homogeneous throughout the pits. Selective excavation will be implemented to decrease the amount of impacted soils sent to the landfill. Impacted soils will be segregated based on degree of impact, with highly impacted or pure phase-containing soils staged for transport to the landfill. The vertical extent of impacted soils does not exceed 10-feet at most sites based on the subsurface investigation. However, impacted soils at the Francis Parke site are believed to extend to 22-feet below surface grade. Impacted soils will be excavated based on soil concentrations in exceedance of allowable concentrations as defined in COGCC Series 900; 10,000 mg/kg TPH in non-sensitive areas and 1,000 mg/kg TPH in sensitive areas. Impacted soils below these concentrations will be replaced in the pit, covered by clean soil fill, compacted, and seeded with native vegetation. A disposal request will be filled out as required by the landfill and the Colorado Department of Public Health and Environment (CDPHE) for all disposed soils. Representative soil samples will be analyzed before transport to the landfill.

Effectiveness: The effectiveness of this technology is considered high. Excavation allows for removal of pure phase and the highest impacted soils identified during investigation activities. The transport of impacted soils to a landfill is an effective means of preventing future surface soil impact. The addition of clean fill to excavated pits will create a barrier between minimally-impacted soils replaced in the pit and the ground surface. This will reduce the potential for impacted soils to seep to the surface. There is a potential for short-term risk to site workers coming into contact with impacted soils, which is considered minimal when compared with the long-term risk reduction resulting from the removal of the impacted soils. The potential for contact between hydrocarbon-impacted soils and site workers during site activities will be mitigated with the appropriate use of personal protective equipment (PPE) and observation of the site specific health and safety plan.

Implementability: The implementability of this technology is considered high. The equipment to excavate and transport the impacted soils can be delivered to each O-Sand location. The proximity of the locations to the landfill capable of accepting the impacted soils increases the implementability. Care will be required when transport trucks drive off the designated roadways. Some surface improvement may be required to ease in soil transport. Excavating below 5 feet may require soil terracing or other safety measures to prevent slumping and protect site workers. Care will be

required when positioning equipment near the edge of the excavation. A larger excavator may be necessary to excavate below 5 feet.

Cost: Cost for this technology is based on the amount of hydrocarbon impacted soils to be removed. Selective excavation and segregation of highly impacted soils will reduce the soil volume and cost. Additionally, this will decrease the amount of clean fill required for backfilling. The price per ton for this alternative is expected to be \$43.04. Assuming a maximum of 22,537 tons of impacted soils, the estimated cost is approximately \$1,137,275. Assuming 11,269 tons of impacted soils, the estimated cost is approximately \$569,138. Assuming 5,634 tons of impacted soils, the estimated cost is approximately \$285,069. Costs for this technology is shown in Table 2.

Conclusion: Based on effectiveness, implementability, and cost, this technology is recommended for further evaluation. This technology will provide immediate removal of impacted soils and will decrease the potential for impacted soils to seep to the surface since the most highly impacted soils are taken off site. This technology provides a timely solution for the removal of impacted soils.

Technology 2: Selective Excavation with Consolidation in Disposal Cell

This technology involves the selective excavation and transport of hydrocarbon-impacted soils to a disposal cell constructed at one of the locations. The disposal cell requires that a new pit be constructed to serve as a disposal cell. Once the material is placed in the cell, it will be capped. During engineering evaluation and design of the disposal cell, the need for a liner may be considered based on applicable regulations and practices. Based on field observations, the impacted soils are not homogeneous throughout the pits. Selective excavation will be implemented to decrease the amount of impacted soils sent to the disposal cell. Impacted soils will be segregated based on degree of impact, with highly impacted or pure phase-containing soils staged for transport to the disposal cell. Impacted soils will be excavated based on soil concentrations in exceedance of allowable concentrations as defined in COGCC Series 900; 10,000 mg/kg TPH in non-sensitive areas and 1,000 mg/kg TPH in sensitive areas. Impacted soils below these concentrations will be replaced in the pit, covered by clean soil fill, compacted, and seeded with native vegetation. Types of caps and liners that could be evaluated during engineering design include but are not limited to compacted clay, evapotranspiration cover, and geosynthetic clay. The estimated thickness of material stored in the disposal cell will be at a minimum 5 feet, but can be increased to aid in minimizing the footprint of the disposal cell. The cover thickness will be based on the cap type and will allow for soil cover and revegetation.

Effectiveness: The effectiveness of this technology is considered moderate to high. Excavation allows for removal of the highest impacted soils as delineated during investigation activities. Hydrocarbon-impacted soils will remain on site in a disposal cell at one of the locations. The highly impacted soils would be removed from their current locations and consolidated in the disposal cell. The addition of clean fill to excavated pits will create a barrier between minimally-impacted soils replaced in the pit and the ground surface. This will reduce the potential for impacted soils to seep to the surface. The effectiveness of placing soils in the disposal cell will be based on the engineering design and selection of the cap and/or liner system. If the cap is compromised at the surface, there may be a possibility of hydrocarbons seeping to the surface. There is a potential for short-term risk to site workers coming into contact with impacted soils, which is considered minimal when compared with the long-term risk reduction resulting from the consolidation of the impacted soils. The potential for contact between hydrocarbon impacted soils and site workers during site activities will be mitigated with the appropriate use of PPE and observation of the site specific health and safety plan.

Implementability: This technology is low to moderately implementable. The equipment to excavate and transport the impacted soils can be delivered to the various locations. The selection of a convenient location for the disposal cell will increase the implementability. Care will be required when transport trucks drive off the designated roadways. Some surface improvement may be required to ease in soil transport. The various cap system technologies have been used in the design of disposal cells. The expected difficulty to find a location for the disposal cell is expected to decrease the implementability. It is expected that a formal agreement with the land owner to allow the construction of the disposal cell will prove difficult due to the question of liability. Additionally, state approval and permitting will be required to implement this technology. Excavating below 5 feet may require soil terracing or other safety measures to prevent slumping and protect site workers. Care is required when positioning equipment near the edge of the excavation. A larger excavator may be necessary to excavate below 5 feet. Long-term monitoring for this technology will require periodic inspection to ensure no surface impact has occurred.

Cost: Cost for this technology is based on the amount of hydrocarbon impacted to be removed and the cap system constructed. Selective excavation of highly impacted soils will reduce the soil volume and cost. Additionally, this will decrease the amount of clean fill required for backfilling. The price per ton for this alternative is expected to be \$34.08. The cost is only a rough estimate, since there are many unknown factors such as the type of cap system, the cost for design, the necessity for a liner, etc. Assuming a maximum of 22,537 tons of impacted soils, the estimated cost is approximately \$900,576. Assuming 11,269 tons of impacted soils, the estimated cost is approximately \$451,790. Assuming 5,634 tons of impacted soils, the estimated cost is approximately \$227,393. Costs for this technology are shown in Table 2.

Conclusion: Determining the location for construction of the disposal cell may prove difficult. It is unknown if there is regulatory acceptance for installing a disposal cell. Placing a disposal cell on one of the locations would require the owner to assume liability for the impacted soils or would require a special covenant. The cost was developed on the limited knowledge of the design of the cap. It is not recommended that this technology be considered for further evaluation.

Technology 3: Selective Excavation with On-site Land Treatment

This technology involves the use of the Bio-Raptor™ system operated by Sub-Surface Waste Management (SSWM) or a technically-equivalent system to screen, mix, and inoculate the hydrocarbon-impacted soils to facilitate bioremediation. Impacted soils would be excavated and transported to a designated land farm area location. Heavy equipment will be used to selectively excavate impacted areas. Based on field observations, the impacted soils are not homogeneous throughout the pits. Selective excavation will be implemented to decrease the amount of impacted soils sent to the landfill. Impacted soils will be segregated based on degree of impact, with highly impacted or pure phase-containing soils staged for transport to the landfill. Impacted soils will be excavated based on soil concentrations in exceedance of allowable concentrations as defined in COGCC Series 900; 10,000 mg/kg TPH in non-sensitive areas and 1,000 mg/kg TPH in sensitive areas. Impacted soils below these concentrations will be replaced in the pit, covered by clean soil fill, compacted, and seeded with native vegetation. More than one land farm may be utilized based on assessment of volume. After treatment, soils would be placed in biopiles. Maintenance of the biopiles may require adding additional water and nutrients. Reapplication may be required while monitoring the hydrocarbon levels after initial treatment. Time for treatment may range from months to a year or more. Upon reaching cleanup objectives, the treated soil would be spread over the sites and seeded with native vegetation.

Effectiveness: Effectiveness of this technology is expected to be moderate to high. One factor in estimating effectiveness is that proper delineation and selective excavation of the hydrocarbon-impacted soils will need to occur. The excavated soils will require characterization to determine the appropriate inoculums and nutrient mixture for treatment of the impacted soils. A bench scale test would be conducted with the selected inoculums and nutrient mix to test the technology's appropriateness. This technology's effectiveness will rely on maintenance and monitoring of the treated soil to determine if reapplication is necessary. This technology has been applied to numerous petroleum sites where weathered crude oil and tar are present. Complete removal of impacted material may not occur, due to the vertical extent of impacted soils. This technology has the potential to eliminate a high percentage of the hydrocarbon-impacted soils. The potential for contact between hydrocarbon-impacted soils and site workers during site activities will be mitigated with the appropriate use of PPE and observation of the site specific health and safety plan.

Implementability: Implementability of this technology is expected to be moderate to high. The equipment to excavate and transport the impacted soils can be delivered to each O-Sand location. The Bio-Raptor or equivalent system is mobile and can be delivered to the site. The system can be moved to the selected land farm location. Minimally impacted soils may be mixed with the highly impacted soils to create a homogenous feed stock or be replaced back in the excavated pit, covered by clean soil fill, compacted, and seeded with native vegetation. The biopile area can be centrally located to minimize soil hauling distances. A fence can be placed around the biopile area to prevent access to humans or animals. Care is required when equipment is positioned near the edge of any excavation and when transport trucks are driving off designated roads. Some surface improvement may be required to ease in soil transport. Availability of the appropriate inoculum is critical for proper implementation. Additionally, water may need to be delivered to the site for maintaining proper moisture conditions required for biodegradation. Monitoring will be required to determine if additional inoculum and nutrients need to be added to the biopiles.

Cost: Cost for this technology is based on excavation, transport, backfill of impacted soils, and initial and re-treatment with the Bio-Raptor system. The price per ton for this alternative is expected to be \$138.69. Assuming a maximum of 22,537 tons of impacted soils, the estimated cost is approximately \$3,664,826. Assuming 11,269 tons of impacted soils, the estimated cost is approximately \$1,832,913. Assuming 5,634 tons of impacted soils, the estimated cost is approximately \$916,957. Costs for this technology are shown in Table 2.

Conclusion: Based on effectiveness and implementability, this technology could be retained for further evaluation. Bench scale testing is required prior to implementation to determine the proper microbial inoculum and nutrient mix for treatment of the impacted soils. This testing would provide data for evaluation of effectiveness. A land farm area will be designated for biopile placement. Ongoing monitoring will be required for assessing success of this technology as well as determining if additional inoculum or nutrients need to be added.

Technology 4: Selective Excavation with Transport to a Local Asphalt Plant

This technology involves the excavation and transportation of hydrocarbon-impacted soils to a local asphalt plant. Heavy equipment will be used to selectively excavate impacted areas. Based on field observations, the impacted soils are not homogenous throughout the pits. Selective excavation will be implemented to decrease the amount of impacted soils sent to the asphalt plant. Impacted soils will be excavated based on soil concentrations in exceedance of allowable concentrations as defined in COGCC Series 900; 10,000 mg/kg TPH in non-sensitive areas and 1,000 mg/kg TPH in sensitive

areas. Impacted soils below these concentrations will be replaced in the pit, covered by clean soil fill, compacted, and seeded with native vegetation. The transported soils would be incorporated into the asphalt mixture.

Effectiveness: Effectiveness of this technology is considered low. Excavation allows for removal of the highest impacted soils identified during investigation activities. The removal and transport of impacted soils off site to the asphalt plant is considered an effective means of preventing future surface soils impact. But, incorporation of the impacted soils into an asphalt plant's operation is not feasible, based on discussion with an asphalt plant near the site. The heterogeneity of the hydrocarbon-impacted soils may make it difficult to produce a homogenous asphalt mix that will meet asphalt standards. Not all components of the delivered material may be useful for in asphalt production and therefore affect the mix. There is a potential for short-term risk to site workers coming into contact with impacted soils, which is considered minimal when compared with the long-term risk reduction resulting from the removal of the impacted soils. The potential for contact between hydrocarbon-impacted soils and site workers during site activities will be mitigated with the appropriate use of PPE and observation of the site specific health and safety plan.

Implementability: Implementability of this technology is considered low. Though hydrocarbon-impacted soils can be excavated and transported off site, no local asphalt plant was willing to accept the soils. Asphalt plants are required to create a product that meets specific standards. The heterogeneity of the hydrocarbon-impacted soils will make it difficult to provide a consistent feed stock to the asphalt plant.

Cost: Cost for this technology is based on excavation, transport, and backfill of impacted soils. There are no costs to be associated with giving the impacted soils to the asphalt plant. The price per ton for this alternative is expected to be \$25.69. Assuming a maximum of 22,537 tons of impacted soils, the estimated cost is approximately \$678,801. Assuming 11,269 tons of impacted soils, the estimated cost is approximately \$339,901. Assuming 5,634 tons of impacted soils, the estimated cost is approximately \$170,450. Costs for this technology are shown in Table 2.

Conclusion: Utilizing the asphalt plant as a means of treatment for petroleum-impacted soils was considered. Yet, there was difficulty in locating a local asphalt plant willing to accept the soils. Selective excavation cannot guarantee plant operators a homogeneous feed stock. Analytical characterization may provide information on the petroleum hydrocarbons found in the soil, but may not provide consistent enough information for plant operation. This technology was not recommended for further evaluation.

Technology 5: Selective Excavation with Thermal Desorption

Thermal desorption involves the treatment of impacted soils by heating the soils to a temperature where volatilization and subsequently desorption occurs. Based on the low volatility of the petroleum hydrocarbons on site, high temperatures would be required for treatment. Some vaporized constituents will be destroyed during the initial heating, but a majority will be treated secondarily as required to meet air quality standards. Thermal oxidation and carbon adsorption are appropriate technologies for off gas treatment. Treated soils may require reprocessing (screening, crushing, or shredding) and retreating before cleanup objectives are met. The treatment unit can be transported between the various locations. Heavy equipment will be used to selectively excavate impacted areas. Based on field observations, the impacted soils are not homogeneous throughout the pits. Selective excavation will be implemented to decrease the amount of impacted soils to be thermally treated. Impacted soils will be segregated based on degree of impact, with highly impacted or pure phase-

containing soils staged for thermal treatment. Impacted soils will be excavated based on soil concentrations in exceedance of allowable concentrations as defined in COGCC Series 900; 10,000 mg/kg TPH in non-sensitive areas and 1,000 mg/kg TPH in sensitive areas. Impacted soils below these concentrations will be replaced in the pit, covered by clean soil fill, compacted, and seeded with native vegetation.

Effectiveness: The effectiveness of this technology is expected to be moderate. Pilot testing will be required to determine the effectiveness of this technology on the impacted soils. This technology has been successful at treating soils with characteristics similar to the site locations. It is expected that higher temperature heating will be required for treatment. Any pure phase pockets of hydrocarbons will be mixed with the highly impacted soils to create a homogenous feed stock. No residual impact is expected on the treated soils. This technology has the potential to eliminate a high percentage of the hydrocarbon-impacted material in a short period of time. The potential for contact between hydrocarbon-impacted soils and site workers during site activities will be mitigated with the appropriate use of PPE and observation of the site specific health and safety plan.

Implementability: This technology is expected to have a moderate to high implementability. Mobile thermal desorption units are available for transport to the site. Due to the lack of utilities expected at the site, propane delivery will be required for system operation. The thermal desorption unit can be moved between locations to decrease the amount of impacted soils moved around. The equipment to excavate and transport the impacted soils can be delivered to the various locations. Care is required when the treatment unit is transported between the various locations. Some surface improvement may be required to ease in the unit's transport. Excavating below 5 feet may require soil terracing or other safety measures to prevent slumping and protect site workers. Care will be required when positioning equipment near the edge of the excavation. A larger excavator may be necessary to excavate below 5 feet.

Cost: Cost for this alternative is based on excavation, treatment, and replacement of soils on the various locations. The cost to deliver the unit to the site is estimated at approximately \$40,000 and the unit treatment cost approximately \$100 per ton. This price is an estimate, since bench scale testing is required to confirm the proper operating conditions of the system. The complete price per ton for this alternative is expected to be \$120.20. Assuming a maximum of 22,537 tons of impacted soils, the estimated cost is approximately \$3,176,326. Assuming 11,269 tons of impacted soils, the estimated cost is approximately \$1,608,663. Assuming 5,634 tons of impacted soils, the estimated cost is approximately \$824,832. Costs for this technology are shown in Table 2.

Conclusion: This technology is recommended for future consideration. This technology provides timely and permanent treatment of the impacted soils. Treated soils can be placed in the excavated pit areas. There would a high percentage of removal of the petroleum hydrocarbons in the treated soils. The treatment unit could be transported between the locations, thus decreasing the amount of soils to be moved off site. The air permit for off gas treatment is expected to be approved for unit operation. Pilot testing will be required to establish operational parameters.

COMPARISON OF RETAINED REMEDIAL TECHNOLOGIES

The results of the technology screening allowed for the selection of an appropriate technology best suited for implementation at the locations. A comparison of the five technologies evaluated is shown in Table 3. Technologies 2 and 4 were not recommended for further consideration. It is expected that siting a location for the disposal cell in Technology 2 will be difficult, since it would require permission from a land owner. It is unlikely any property owner will want to assume the liability for

the installation of the disposal cell. Long-term management will be required to ensure integrity and that proper function of the disposal cell is continually met. Also, approval and permitting with state agencies is expected to be difficult. Estimating the price for Technology 2 is difficult, since the type of cap system has not been determined and that is required as well as the cost to design the system. In researching Technology 4, URS was unable to identify an asphalt plant willing to accept the petroleum-impacted soils. Though this technology has the lowest estimated cost, the low implementability and effectiveness makes it impossible to implement this technology unless an agreeable asphalt plant is identified in the future.

Technologies 3 and 5 provide treatment of the impacted soils and are expected to be effective and implementable at site locations. The end product is expected to produce non-impacted soils. Treated soils from Technology 5 can be replaced back in the original pit location because the period of time required for treatment is relatively short. Because the biological treatment of Technology 3 may take longer, it may not be feasible to leave the excavated pits open during treatment and may be filled with clean fill. Once treatment is complete, the soils may be spread on the surface and may be seeded to grow native vegetation. Both technologies require bench scale testing before a final operating conditions can be established. Treatment units for both technologies can be transported to the site. The cost of applying these technologies is anticipated to go up if impacted soils volumes decrease. The treatment time for Technology 3 depends on seasonal conditions, concentrations of petroleum hydrocarbons, and inoculum choice. Ongoing monitoring will be required to determine if reapplication of the inoculum is required. The thermal desorption unit will likely have to run at a high temperature to allow for volatilization of the petroleum hydrocarbons. The cost may increase if price of fuel goes up.

Technology 1, transport of impacted soils to the Logan County Landfill, was determined to be the most efficient means to address impacted soils at the site. The proximity of the locations to the landfill makes this technology readily implementable. Transporting the impacted soils off site will prevent any future impact from these materials. Selective excavation is expected to reduce the amount of impacted soils requiring disposal. The reduction in volume will reduce the cost, since cost is based on the volume of material and the amount of time required excavating, transporting, and backfill the affected areas. This technology will provide timely reduction of impacted soils and will not require any additional monitoring or follow-up treatment. This option provides the best balance between effectiveness, implementability, and cost.

We appreciate this opportunity to work with the COGCC on this important remediation project. Should you have any questions regarding this report, please feel free to contact me at 303-740-3965.

Sincerely,



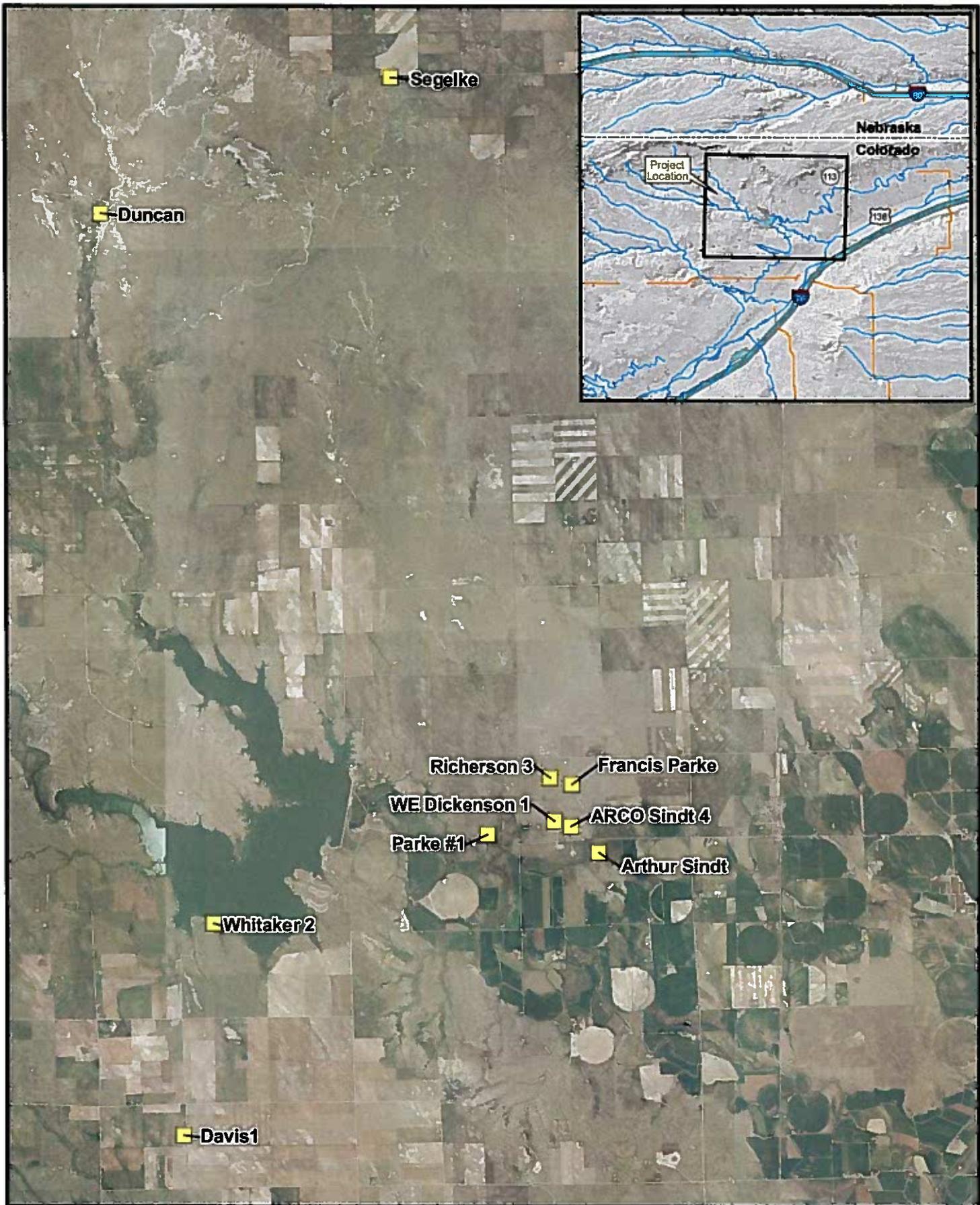
Andrea Resch Gardiner, PE
Environmental Engineer



Stuart Francone, CES
Regional Director, Oil and Gas Services

Attachment

Figures



Legend
 Sample Sites


 8,000 0
 Feet
 Scale 1:96000 or 1 in = 8000 ft

FIGURE 1 SITE MAP

*O-Sand Site Investigation
 and Limited Feasibility Study*

FILE NAME	DATE	DRAWN BY
site_map.mxd	7/11/07	GCK





Legend

	Non-impacted Boring
	Impacted Boring
	Estimated Boundary of Impacted Soil
	Possible Boundary of Impacted Soil

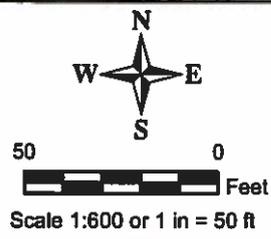
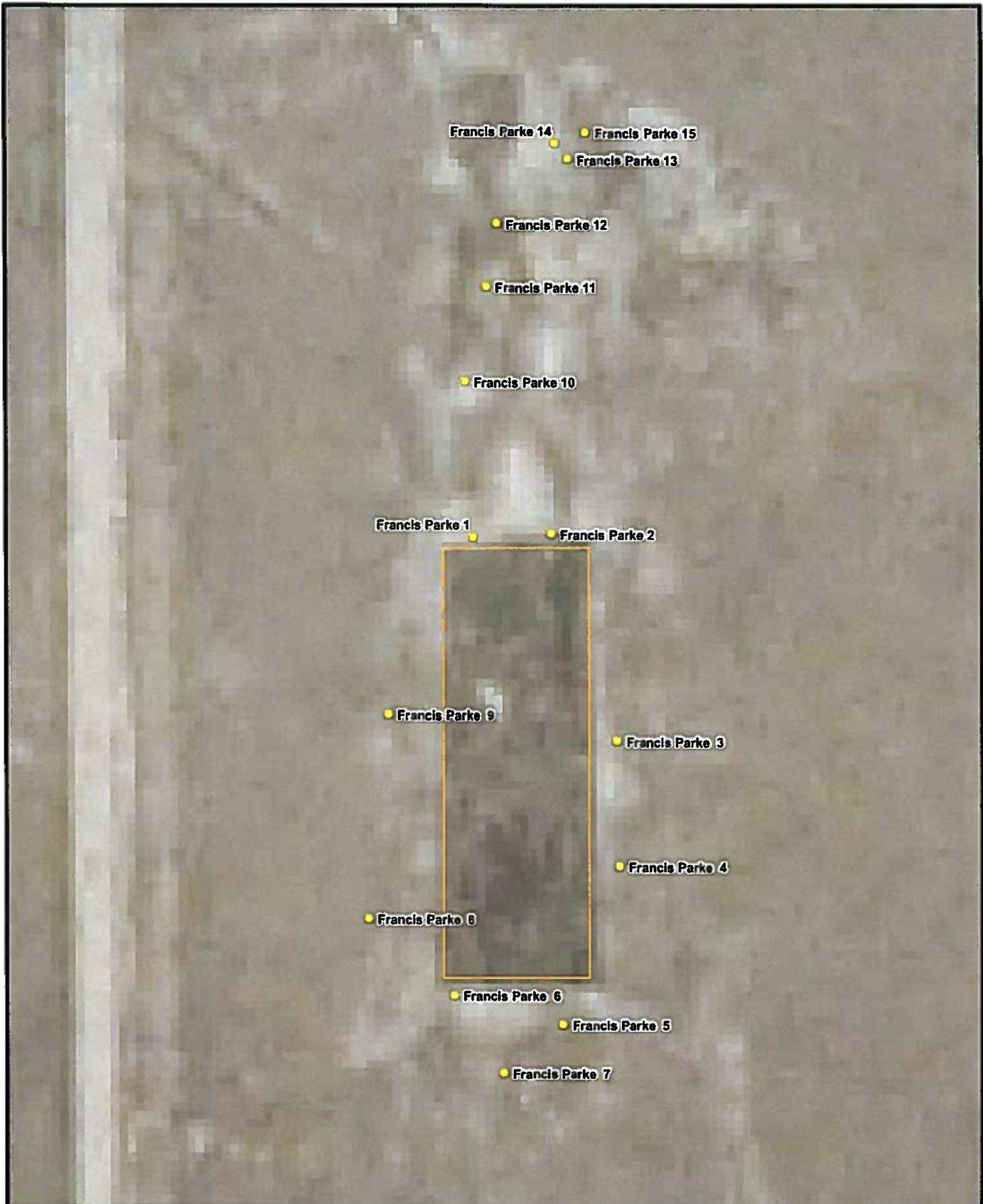


FIGURE 2 SAMPLE LOCATIONS AT ARCO SINDT 4

O-Sand Site Investigation and Limited Feasibility Study

FILE NAME	DATE	DRAWN BY
sample_locs_arco-sindt4.mxd	9/18/07	GCK





Legend

- Non-impacted Boring
- ▭ Estimated Boundary of Impacted Soil



Scale 1:600 or 1 in = 50 ft

FIGURE 3 SAMPLE LOCATIONS AT FRANCIS PARKE

O-Sand Site Investigation and Limited Feasibility Study

FILE NAME	DATE	DRAWN BY
sample_locs_francis_parke.mxd	9/19/07	GCK





Legend

- Non-impacted Boring
- Impacted Boring
- Estimated Boundary of Impacted Soil



50 0
 Feet
 Scale 1:600 or 1 in = 50 ft

FIGURE 4 SAMPLE LOCATIONS AT PARKE #1

O-Sand Site Investigation and Limited Feasibility Study

FILE NAME	DATE	DRAWN BY
sample_locs_parke#1.mxd	9/19/07	GCK





Legend

- Non-impacted Boring
- Impacted Boring
- Estimated Boundary of Impacted Soil



50 0

 Feet
 Scale 1:600 or 1 in = 50 ft

FIGURE 5 SAMPLE LOCATIONS AT WHITAKER 2

O-Sand Site Investigation and Limited Feasibility Study

FILE NAME	DATE	DRAWN BY
sample_locs_whitaker2.mxd	7/3/07	GCK





Legend

- Non-impacted Boring
- Impacted Boring
- Estimated Boundary of Impacted Soil



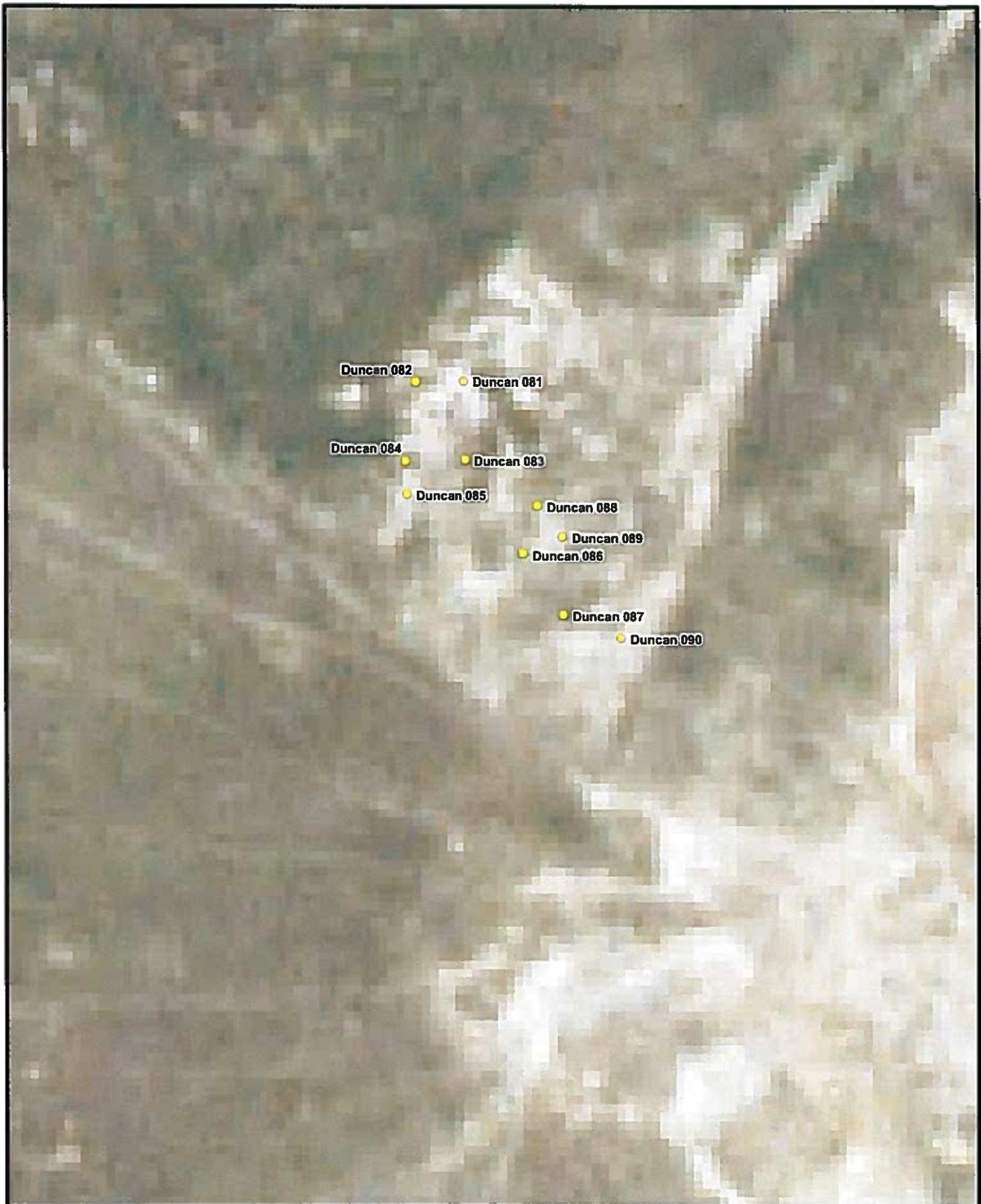
Scale 1:600 or 1 in = 50 ft

FIGURE 6 SAMPLE LOCATIONS AT DAVIS 1

O-Sand Site Investigation and Limited Feasibility Study

FILE NAME	DATE	DRAWN BY
sample_locs_davis#1.mxd	9/18/07	GCK





Legend

● Non-impacted Boring



50 0
 Feet
 Scale 1:600 or 1 in = 50 ft

FIGURE 7 SAMPLE LOCATIONS AT DUNCAN

O-Sand Site Investigation and Limited Feasibility Study

FILE NAME	DATE	DRAWN BY
sample_locs_duncan.mxd	9/19/07	GCK





Legend

- Non-impacted Boring
- Impacted Boring
- Estimated Boundary of Impacted Soil

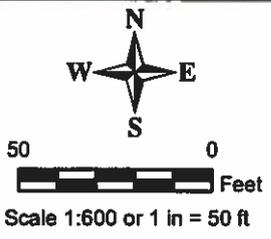


FIGURE 8 SAMPLE LOCATIONS AT SEGELKE 1

O-Sand Site Investigation and Limited Feasibility Study

FILE NAME	DATE	DRAWN BY
sample_locs_segelke1.mxd	6/28/07	GCK





Richerson 3

WE Dickenson



Arthur Sindt #4



Legend

 Approximate Locations



FIGURE 9 LOCATIONS OF ARTHUR SINDT #4, RICHERSON 3, AND WE DICKINSON

O-Sand Site Investigation and Limited Feasibility Study

FILE NAME	DATE	DRAWN BY
multiple_locs.mxd	10/29/07	GCK



Tables

Table 1: Estimated Volumes of Impacted Soils Based on Field Observations

Site	Original Pit Dimensions	Estimated Dimensions of Impacted Soils	Estimated Maximum Total Volume of Impacted Soils	Estimated Selectively Excavated Total Volume of Impacted Soils (50%)	Estimated Selectively Excavated Total Volume of Impacted Soils (25%)
Arco Sindt 4	132 feet x 125 feet x 10 feet	30 feet x 15 feet x 3 feet 50 feet x 40 feet x 3 feet 30 feet x 15 feet x 5 feet 30 feet x 40 feet x 1 feet	400 yd ³	200 yd ³	100 yd ³
Francis Parke	375 feet x 60 feet x 6 feet	56 feet x 167 feet x 22 feet	7,620 yd ³	3,810 yd ³	1,905 yd ³
Parke #1	Unknown	2 feet x 2 feet x 2 feet	0.3 yd ³	0.15 yd ³	0.075 yd ³
Whitaker 2	Unknown	12.5 feet x 40 feet x 8 feet 20 feet x 40 feet x 10 feet	444 yd ³	222 yd ³	111 yd ³
Davis 1	Pit 1: 40 feet x 50 feet x 6 feet Pit 2: 40 feet x 80 feet x 6 feet Pit 3: 50 feet x 90 feet x 6 feet Skim Pit: 15 feet x 15 feet x 6 feet	40 feet x 60 feet x 6 feet 62 feet x 43 feet x 10 feet 23 feet x 105 feet x 10 feet	2,415 yd ³	1,208 yd ³	604 yd ³

Table 1: Estimated Volumes of Impacted Soils Based on Field Observations

Site	Original Pit Dimensions	Estimated Dimensions of Impacted Soils	Estimated Maximum Total Volume of Impacted Soils	Estimated Selectively Excavated Total Volume of Impacted Soils (50%)	Estimated Selectively Excavated Total Volume of Impacted Soils (25%)
Duncan	120 feet x 120 feet x 15 feet	None Observed	0 yd ³	0 yd ³	0 yd ³
Segelke 1	30 feet x 40 feet 40 feet x 40 feet Skim Pit: 10 feet x 10 feet	50 feet x 50 feet x 6 feet 25 feet x 65 feet x 4 feet 30 feet x 50 feet x 4 feet	1,019 yd ³	510 yd ³	255 yd ³
WE Dickenson	Pit 1: 50 feet x 100 feet x 6 feet Pit 2: 150 feet x 100 feet x 6 feet Pit 3: 200 feet x 100 feet x 6 feet	200 feet x 200 feet x 6 feet	5,000 yd ³	2,500 yd ³	1,250 yd ³
Richerson 3	Pit 1: 125 feet x 100 feet x 6 feet Pit 2: 103 feet x 125 feet x 6 feet	125 feet x 100 feet x 6 feet 103 feet x 125 feet x 6 feet	5,639 yd ³	2,819 yd ³	1,409 yd ³
Total Estimated Volume of Impacted Soil			22,537 yd³	11,269 yd³	5,634 yd³

Note:

yd³ = cubic yard

Table 2: Cost Analysis for Selected Technologies

Technology	Task	Cost	Unit	Total Price based on 22,537 tons (100% of Estimated Impacted Soil)	Total Price based on 11,213 tons (50% of Estimated Impacted Soil)	Total Price based on 5,634 tons (25% of Estimated Impacted Soil)
Technology 1: Selective Excavation with Transport to and Disposal at the Logan County Landfill ¹						
	Excavation	\$1.50	ton	\$33,805.50	\$16,902.75	\$8,451.38
	Mobilization of Excavation Equipment to Site	\$1,000.00	unit	\$1,000.00	\$1,000.00	\$1,000.00
	Transport to Landfill for Disposal	\$6.35	ton	\$143,109.95	\$71,554.98	\$35,777.49
	Disposal	\$18.00	ton	\$405,666.00	\$202,833.00	\$101,416.50
	Backfill, Compaction, and Seeding	\$17.15	ton	\$386,509.55	\$193,254.78	\$96,627.39
			Total Cost	\$970,091	\$485,546	\$243,273
			Total Cost per Ton	\$43.04		
Technology 2: Selective Excavation with Consolidation in Disposal Cell ^{1,2}						
	Excavation	\$1.50	ton	\$33,805.50	\$16,902.75	\$8,451.38
	Mobilization of Excavation Equipment to Site	\$1,000.00	unit	\$1,000.00	\$1,000.00	\$1,000.00
	Transport to Landfill	\$6.35	ton	\$143,109.95	\$71,554.98	\$35,777.49
	Backfill, Compaction, and Seeding	\$17.15	ton	\$386,509.55	\$193,254.78	\$96,627.39
	Permitting	\$2,000.00	unit	\$2,000.00	\$2,000.00	\$2,000.00
	Compliance Sampling	\$5.00	ton	\$112,685.00	\$56,342.50	\$28,171.25
	Design and Construction of Cap	\$32,000.00	acre	\$89,402.98	\$52,415.21	\$26,205.62
			Total Cost	\$768,513	\$393,470	\$198,233
			Total Cost per Ton	\$34.10		
Technology 3: Selective Excavation with On-site Land Treatment ^{1,3}						
	Excavation	\$1.50	ton	\$33,805.50	\$16,902.75	\$8,451.38
	Mobilization of Excavation Equipment to Site	\$1,000.00	unit	\$1,000.00	\$1,000.00	\$1,000.00
	Backfill, Compaction, and Seeding	\$17.15	ton	\$386,509.55	\$193,254.78	\$96,627.39
	Initial Treatment of Impacted Soils	\$80.00	ton	\$1,802,960.00	\$901,480.00	\$450,740.00
	Monitoring of Soil and Addition of Amendments	\$40.00	ton	\$901,480.00	\$450,740.00	\$225,370.00
			Total Cost	\$3,125,755	\$1,563,378	\$782,189
			Total Cost per Ton	\$138.69		
Technology 4: Selective Excavation with Transport to a Local Asphalt Plant ¹						
	Excavation	\$1.50	ton	\$33,805.50	\$16,902.75	\$8,451.38
	Mobilization of Excavation Equipment to Site	\$1,000.00	unit	\$1,000.00	\$1,000.00	\$1,000.00
	Transport to Asphalt Plant	\$7.00	ton	\$157,759.00	\$78,879.50	\$39,439.75
	Backfill, Compaction, and Seeding	\$17.15	ton	\$386,509.55	\$193,254.78	\$96,627.39
			Total Cost	\$579,074	\$290,037	\$145,519
			Total Cost per Ton	\$25.69		
Technology 5: Selective Excavation with Thermal Desorption ^{1,4}						
	Excavation	\$1.50	ton	\$33,805.50	\$16,902.75	\$8,451.38
	Mobilization of Excavation Equipment to Site	\$1,000.00	unit	\$1,000.00	\$1,000.00	\$1,000.00
	Backfill, Compaction, and Seeding	\$17.15	ton	\$386,509.55	\$193,254.78	\$96,627.39
	Mob of Thermal Desorption Unit	\$40,000.00	unit	\$40,000.00	\$40,000.00	\$40,000.00
	Treatment of Soil	\$100.00	ton	\$2,253,700.00	\$1,126,850.00	\$563,425.00
			Total Cost	\$2,715,015	\$1,378,008	\$709,504
			Total Cost per Ton	\$120.47		

Comments:

- 1 - Budgetary cost for excavation, disposal, and backfilling developed by Johnson-Palmer Construction, Inc. and received by URS on 9/28/2007.
- 2 - Costs for membrane construction are estimated based on MSW Management, The Journal for Municipal Solid Waste Professionals, Landfill Economics Part II: Getting Down to Business accessed on July 2, 2007. Depth of impacted soil estimated at 5 feet.
- 3 - Estimated costs provided by Bezhad Mirzayi of SWWM in a phone conversation on June 20, 2007. Cost estimates made without review of soil analytical information.
- 4 - Estimated costs for thermal desorption provided by Roger Dunham of Remedial Solutions, Inc. in a phone conversation on June 25, 2007. Cost estimates made without review of soil analytical information.

Table 3: Comparison of Screening Criteria

Technology	Technology Description	Effectiveness	Implementation	Cost
Technology 1: Selective Excavation with Transport to and Disposal at the Logan County Landfill	Selectively excavate pure phase hydrocarbons and highly impacted soils. Excavation will occur to the depth practicable. Minimally impacted soils will be replaced in the excavated areas and will be compacted. Additional fill be added as needed and surface will be seeded. Impacted soils will be transported to the Logan County Landfill.	<p>High</p> <ul style="list-style-type: none"> • Will remove impacted soils • Will prevent surface impact • Will provide permanent off site disposal for removed materials 	<p>High</p> <ul style="list-style-type: none"> • Landfill located in close proximity to the site • Excavation equipment and technique appropriate for the site 	<p>Low</p> <ul style="list-style-type: none"> • Cost per ton: \$38.50 • Estimated cost assuming 100% of estimated volume: \$1,000,576 • Estimated cost assuming 50% of estimated volume: \$500,308
Technology 2: Selective Excavation with Consolidation in Disposal Cell	Selectively excavate pure phase hydrocarbons and highly impacted soils. Excavation will occur to the depth practicable. Minimally impacted soils will be replaced in the excavated areas and will be compacted. Disposal cell located on site. Cell cap and/or lined based on regulations.	<p>Moderate to High</p> <ul style="list-style-type: none"> • Will remove impacted soils near the surface • Will consolidate impacted soils • Will reduce potential for impacted soils to seep to the surface 	<p>Low to Moderate</p> <ul style="list-style-type: none"> • Disposal cell location will need to be determined • Requires land owner approval • Requires state approval and permit • Excavation equipment and technique appropriate for the site • Cap material to be determined 	<p>Low</p> <ul style="list-style-type: none"> • Cost per ton: \$22.53 • Estimated cost assuming 100% of estimated volume: \$663,499 • Estimated cost assuming 50% of estimated volume: \$332,943
Technology 3: Selective Excavation with On-site Land Treatment (Bio-Raptor™ or equivalent)	Selectively excavate pure phase hydrocarbons and highly impacted soils. Excavation will occur to the depth practicable. Minimally impacted soils will be replaced in the excavated areas and will be compacted. Additional fill be added as needed and surface will be seeded. Impacted soils will be treated using the Bio-Raptor™ system that will add microbial inoculum and nutrients. Treated soils will be land farmed at a designated location. Monitoring will be required to assess progress of treatment. Additional treatments may be required. Treated soils will be spread on site.	<p>Moderate to High</p> <ul style="list-style-type: none"> • Will remove impacted soils near the surface for treatment in biopile • Effectiveness will be based on proper selection of inoculum and nutrients • Will require monitoring and potential additional inoculation 	<p>Moderate to High</p> <ul style="list-style-type: none"> • Bio-Raptor™ can be transported to the site • Excavation equipment and technique appropriate for the site • Expected that appropriate inoculum can be found • Water will need to be delivered to the site for moisture control 	<p>Moderate</p> <ul style="list-style-type: none"> • Cost per ton: \$129.50 • Estimated cost assuming 100% of estimated volume: \$3,365,576 • Estimated cost assuming 50% of estimated volume: \$1,682,853

Table 3: Comparison of Screening Criteria

Technology	Technology Description	Effectiveness	Implementation	Cost
Technology 4: Selective Excavation with Transport to a Local Asphalt Plant	<p>Selectively excavate pure phase hydrocarbons and highly impacted soils. Excavation will occur to the depth practicable. Minimally impacted soils will be replaced in the excavated areas and will be compacted. Additional fill be added as needed and surface will be seeded. Impacted soils will be transported to a local asphalt plant where it will be added to the mix.</p>	<p>Low</p> <ul style="list-style-type: none"> • Will remove impacted soils near the surface • Mixing of impacted soils with asphalt plant feed mixture not expected to be feasible 	<p>Low</p> <ul style="list-style-type: none"> • Excavation equipment and technique appropriate for the site • Unable to find a asphalt plant to accept the impacted soil 	<p>Low</p> <ul style="list-style-type: none"> • Cost per ton: \$16.50 • Estimated cost assuming 100% of estimated volume: \$428,818 • Estimated cost assuming 50% of estimated volume: \$214,417
Technology 5: Selective Excavation with Thermal Desorption	<p>Selectively excavate pure phase hydrocarbons and highly impacted soils. Excavation will occur to the depth practicable. Minimally impacted soils will be replaced in the excavated areas and will be compacted. Additional fill be added as needed and surface will be seeded. Impacted soils will be treated using the thermal desorption to heat and remove hydrocarbons. Treated soils will be replaced in excavated areas.</p>	<p>Moderate</p> <ul style="list-style-type: none"> • Pilot test would be required to assess appropriateness • Technology has been applied to hydrocarbons with low volatility 	<p>Moderate to High</p> <ul style="list-style-type: none"> • Necessary equipment can be delivered to the locations • Fuel will need to be delivered to the site • Appropriate heating temperatures are expected to be achievable 	<p>Moderate</p> <ul style="list-style-type: none"> • Cost per ton: \$111.04 • Estimated cost assuming 100% of estimated volume: \$2,885,795 • Estimated cost assuming 50% of estimated volume: \$1,462,953

Appendix A

**ARCO Sindt
Photo Log**





**Francis Parke
Photo Log**



**Parke #1
Photo Log**



Davis 1

Photo Log



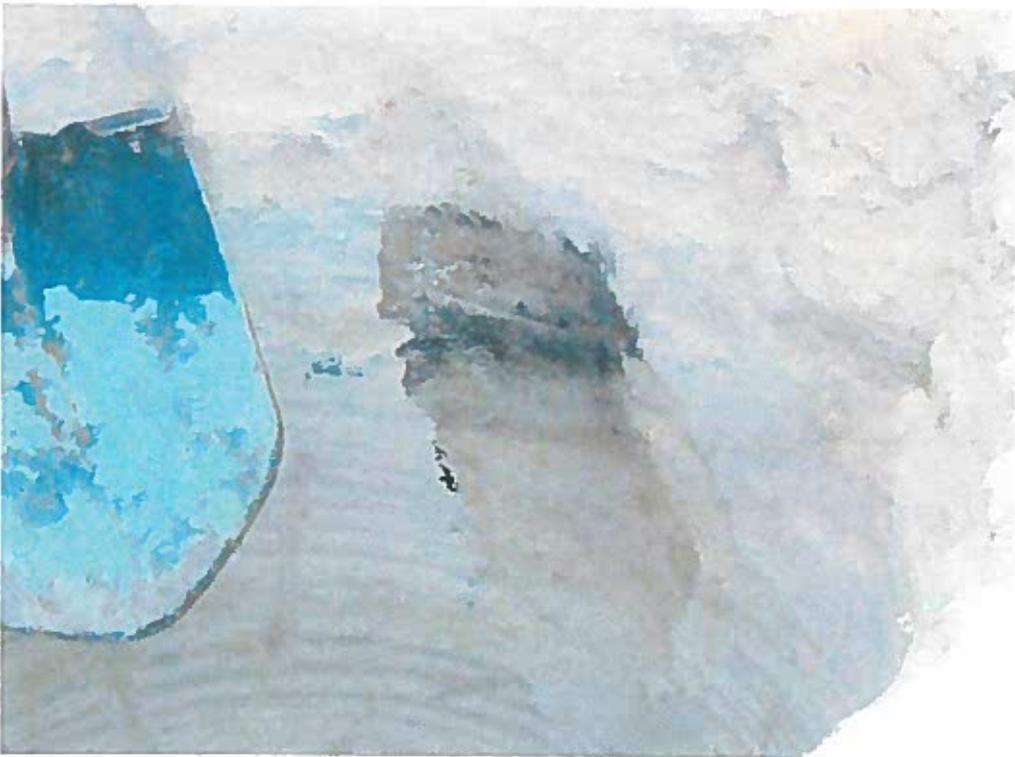




Duncan Photo Log



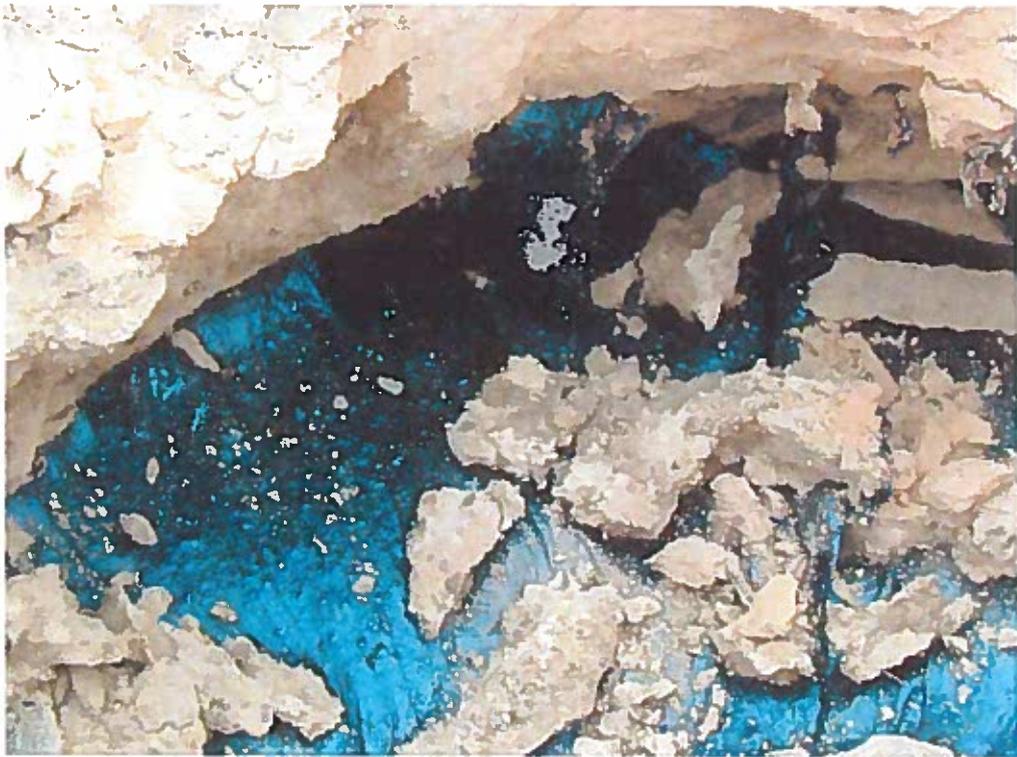
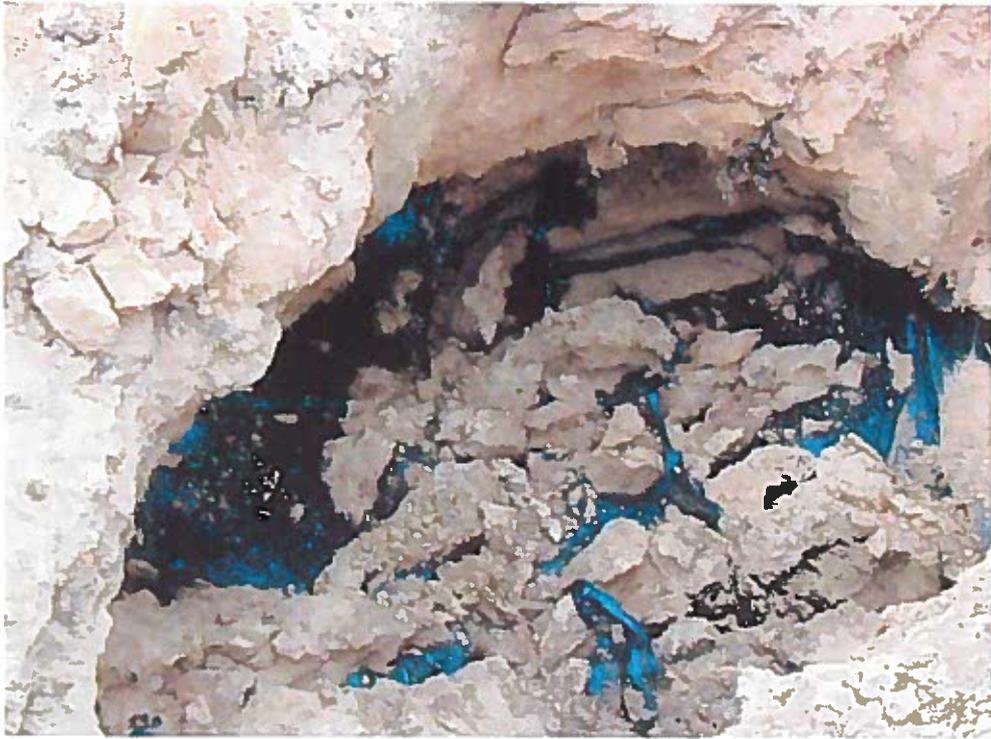
**WE Dickenson
Photo Log**













**Arthur Sindt 4
Photo Log**



A. Simdt #4

③ ~~SE SW Sec 6~~ T9N - R52W
NENE Sec 7

② NENE Sec 7 T9N, R52W
Arthur Smdt #4



Appendix B



99999999

OF COLORADO
SERVATION COMMISSION
f Natural Resources

Padroni West
RECEIVED

JUN 30 1986

APPLICATION FOR PERMIT TO USE EARTHEN PIT

COLD OIL & GAS CONSV. COMM.

1. CHECK ONE: NEW PIT EXISTING PIT TREATMENT FACILITY OTHER

2. NAME OF OPERATOR Lewis & Clark Exploration Company *Padroni West*

3. ADDRESS OF OPERATOR 1625 Broadway Ste. #2770, Denver, CO 80202 PHONE NO. (303)825-2444

4. LEASE NAME Arco-Sindt 5. PRODUCING FORMATION "J" sand 6. GROUND ELEVATION 4030'

7. LOCATION (Report location clearly to the nearest 10 acres) C S/2 SW SE Sec 6, T9N-R52W 8. COUNTY Logan 9. STATE CO

10. SIZE OF PIT: LENGTH 132 FT. WIDTH 125 FT. DEPTH 10 FT.

11. CAPACITY 29,400 BBLs. 12. ESTIMATED INFLOW 550 BWPD BIS/DAY \uparrow

13. DISPOSAL OF PIT CONTENT: HAULED _____ DISPOSAL WELL _____ EVAPORATION X

14. MAXIMUM FLUID LEVEL ABOVE AVG. GROUND LEVEL 2 1/2 FT.

15. DRAINAGE DISTANCE IN FEET TO CLOSEST FRESH WATER POND, STREAM OR LAKE Irrigation Canal 1100' and North Branch Creek 2200' FT.

16. SUBSOIL TYPE Clay (Cretaceous Pierre Shale fm)

17. TYPE OF SEALING MATERIAL (Including specifications and Method of Application)
Clay of Pierre shale formation substratum forms natural sealant at base of pit.

18. ADDITIONAL INFORMATION (By attachment include detailed plan of operation, chemical analysis of produced water, necessary maps, logs and other information as may be required by Rules 325 and 326 of the Rules and Regulations of the Oil and Gas Conservation Commission.)
See Attached Materials

Note the low Chloride content of the two water chemical analyses which are 1130 and 1213 milligrams/liter.

These produced fresh waters are a potentially useable water source for agricultural purposes and do not threaten to contaminate the surface environment.

19. I HEREBY CERTIFY THAT THE FOREGOING IS TRUE AND CORRECT

SIGNED *Donald R. Hemare* TITLE *President* DATE *6.27.86*

THIS SPACE FOR COMMISSION USE

APPROVED BY *William Smith* TITLE *O & G Cons. Comm.* DATE *AUG 13 1986*

CONDITIONS OF APPROVAL, IF ANY:



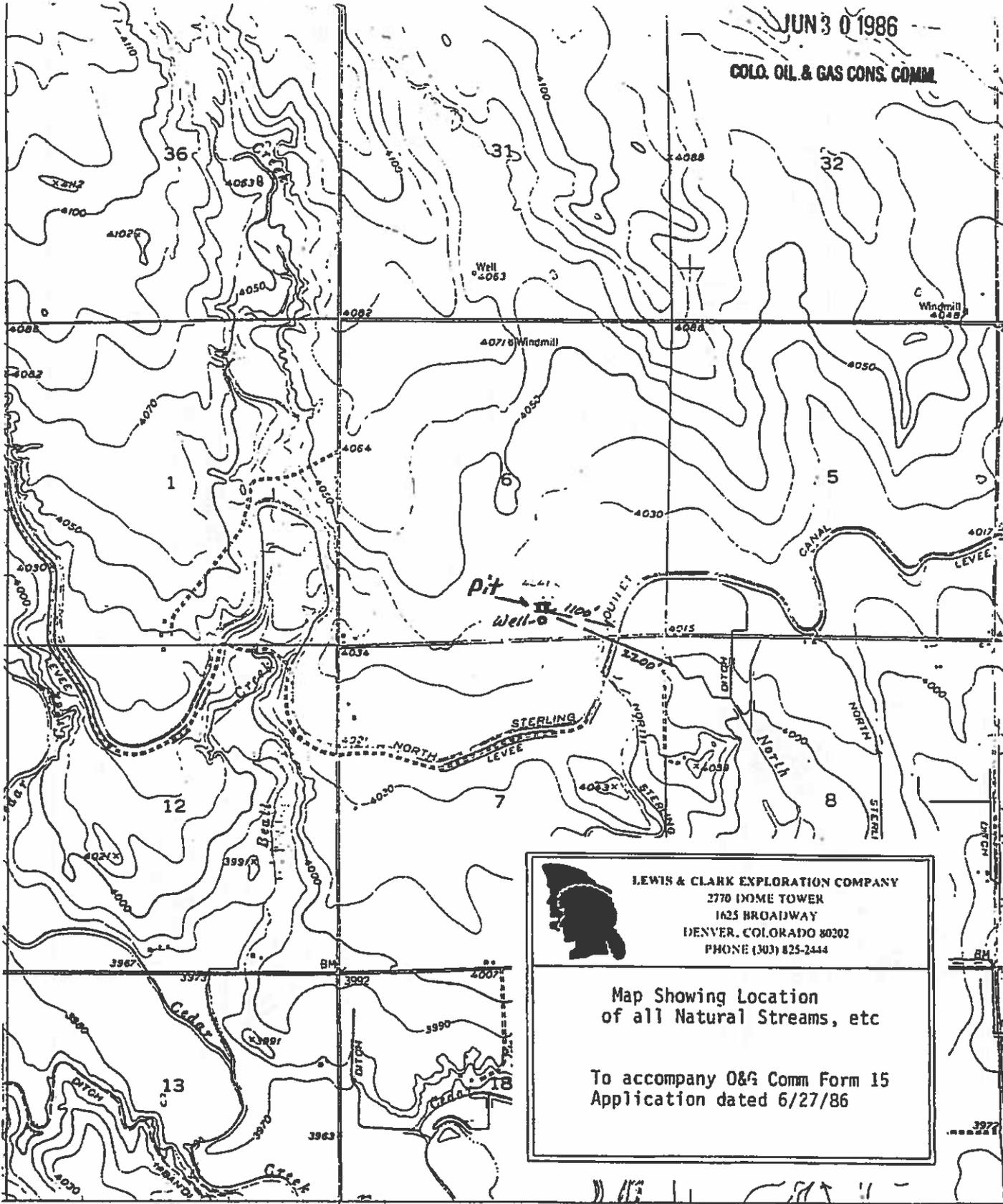
00884538

116261

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JUN 30 1986

COLO. OIL & GAS CONS. COMM.



 LEWIS & CLARK EXPLORATION COMPANY
2770 DOME TOWER
1625 BROADWAY
DENVER, COLORADO 80202
PHONE (303) 825-2444

Map Showing Location
of all Natural Streams, etc

To accompany O&G Comm Form 15
Application dated 6/27/86

R. 53 W

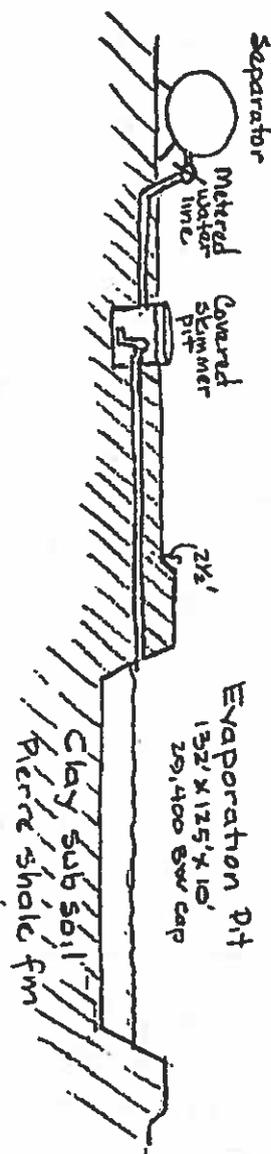
STERLING 9.3 MI

12 630 000 FEET R. 52 W

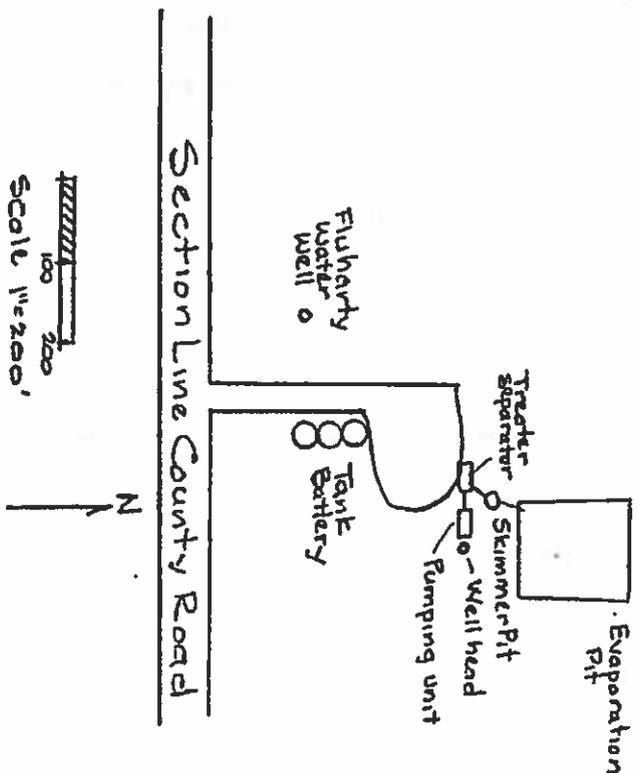
1230'

RECEIVED
 JUN 30 1986
 COLO. OIL & GAS CONS. COMM.

Schematic Sketch



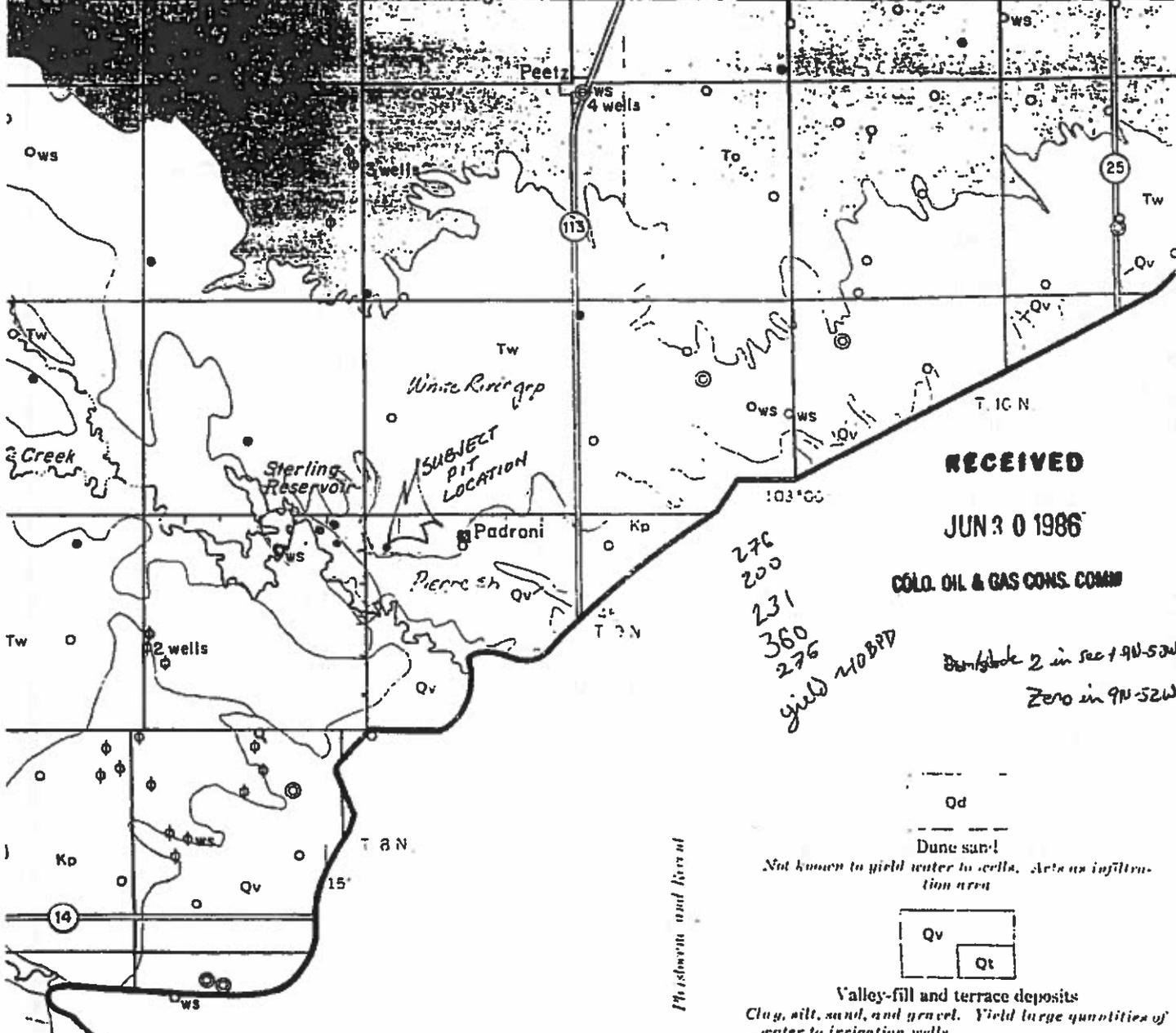
Location Plan of Separation Facility



LEWIS & CLARK EXPLORATION COMPANY
 27th DOME TOWER
 1625 BROADWAY
 DENVER, COLORADO 80202
 PHONE (303) 825-2444

Location Plan and
 Schematic Sketch
 of Retaining Pit and
 Separation Facility
 To Accompany O&G Comm
 Form 15 App1 dated 6/27/86

R 54 W. NEBRASKA R 53 W 15' R 52 W R 51 W 103 00' R 50 W R 49 W



RECEIVED

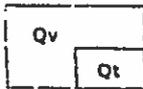
JUN 30 1986

COLD. OIL & GAS CONS. COMM

276
200
231
360
276
yield 40BPP

Block 2 in sec 14N-52W
Zero in 9N-52W

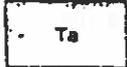
Qd
Dune sand!
Not known to yield water to wells. Acts as infiltration area



Valley-fill and terrace deposits
Clay, silt, sand, and gravel. Yield large quantities of water to irrigation wells
Qv, valley-fill deposits
Qt, terrace deposits



Ogallala Formation
Clay, silt, sand, and gravel partly cemented by calcium carbonate. Yields small to moderate quantities of water



Arikaree Formation
Fine to medium-grained sand heavily to moderately cemented. May yield some amounts of water



LEWIS & CLARK EXPLORATION COMPANY
2770 DOME TOWER
1625 BROADWAY
DENVER, COLORADO 80202
PHONE (303) 825-2444

Surface Geologic Map
from Water Supply Paper 1809-L
(U.S.G.S. 1965)

To accompany O&G Comm Form 15
Appl. dated 6/27/86

T. 7 N
63
40° 30'
T. 6 N

Pliocene and later
Pliocene
Holocene

CORE LABORATORIES, INC



1300 SOUTH POTOMAC ST. SUITE 130
AURORA, CO. 80012

RECEIVED

PHONE: (303) 751-1780

JUN 30 1986

COLO. OIL & GAS CONS. COMM.

ANALYTICAL REPORT

COMPANY: LEWIS AND CLARK

DATE SAMPLED:

WELL NAME: ARCO SINDT 15-15

DATE RECEIVED: 28-APR-86

TYPE OF WATER:

DATE ANALYZED: 29-APR-86

DEPTH:

FILE NUMBER: 6307-W86321

LEASE:

LOCATION:

FORMATION:

COUNTY: LOGAN COLO.

SAMPLE #: 1

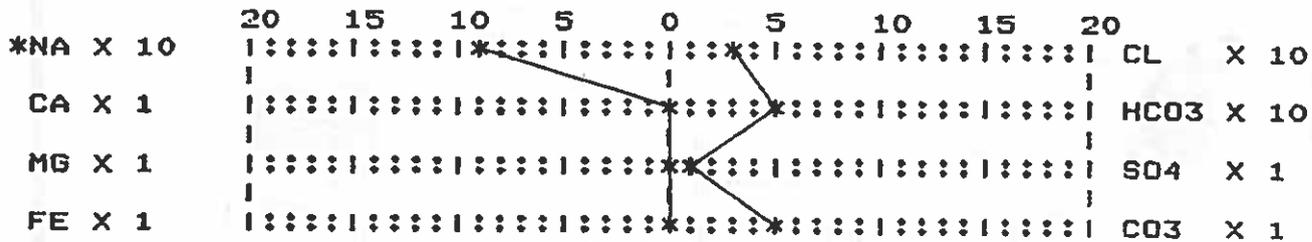
CONSTITUENTS

CATIONS	MG/L	MEQ/L	ANIONS	MG/L	MEQ/L
CALC. SODIUM (NA)	1966	85.5	CHLORIDE (CL)	1130	31.9
CALCIUM (CA)	1.9	0.1	SULFATE (SO4)	66	1.4
MAGNESIUM (MG)	0.7	0.1	CARBONATE (CO3)	147	4.9
IRON (FE)	0.1	0.0	BICARBONATE (HCO3)	2910	47.7
POTASSIUM (K)	6.2	0.2	HYDROXIDE (OH)	<0.1	0.0
TOTAL DISSOLVED SOLIDS (CALC.)			6228	MG/L	

HYDROGEN SULFIDE: NEGATIVE

PHYSICAL PROPERTIES

PH	8.67
SPECIFIC GRAVITY @ 77 F	1.0039
RESISTIVITY (OHM-METERS) @ 77 F	1.43



:-INCLUDES POTASSIUM MEQ

These analyses, opinions or interpretations are based on observations and material supplied by the client to whom, and for whose exclusive and confidential use, this report is made. The interpretations or opinions expressed represent the best judgment of Core Laboratories, Inc. (all errors and omissions excepted); but Core Laboratories, Inc. and its officers and employees, assume no responsibility and make no warranty or representations, as to the productivity, proper operations, or profitability of any oil, gas, coal or other mineral property, well or sand in connection with which such report is used or relied upon.

* DENVER DIVISION LAB *
* HALLIBURTON SERVICES *
* BOX 1510 *
* EVANSVILLE, WY 82636 *

RECEIVED

JUN 30 1986

COLO OIL & GAS CONS. COMM.

DATE: MAY 7, 1986

TO: BOB FIELDING
- HALLIBURTON SERVICES
- DENVER, CO

REPORT NO: W86-0253

COMPANY: ANDERMAN-SMITH OPERATING

DATE REC'D: MAY 6, 1986

WELL NO: ARCO SINDT #6-15
Lewis & Clark

FORMATION: "J" SAND

LOCATION: *SW SE*
SEC6-9N-52W
LOGAN CO, CO

SPECIFIC GRAVITY -----	1.001	
PH -----	8.2	
IRON (FE) -----	<1	MPL
POTASSIUM (K) -----	9	"
SODIUM (NA) -----	1888	"
CALCIUM (CA) -----	8	"
MAGNESIUM (MG) -----	1	"
CHLORIDES (CL) -----	1213	"
SULFATES (SO4) -----	68	"
CARBONATES (CO3) -----	105	"
BICARBONATES (HCO3) -----	2669	"
TDS -----	✓ 5961	"
RESISTIVITY -----	1.9	"

REMARKS:
OIL GRAV: 37.1 API @ 60 F.
GRIND OUT: 77.5% WATER
2.5% EMULSION
20% OIL

OHMS AT 66 DEGREES F

CC: FILE
RANDY YEAGER

RESPECTFULLY SUBMITTED,

BY: A.A. KERNS

RECEIVED

JUN 30 1986

COLD WATER GALLONS 6000

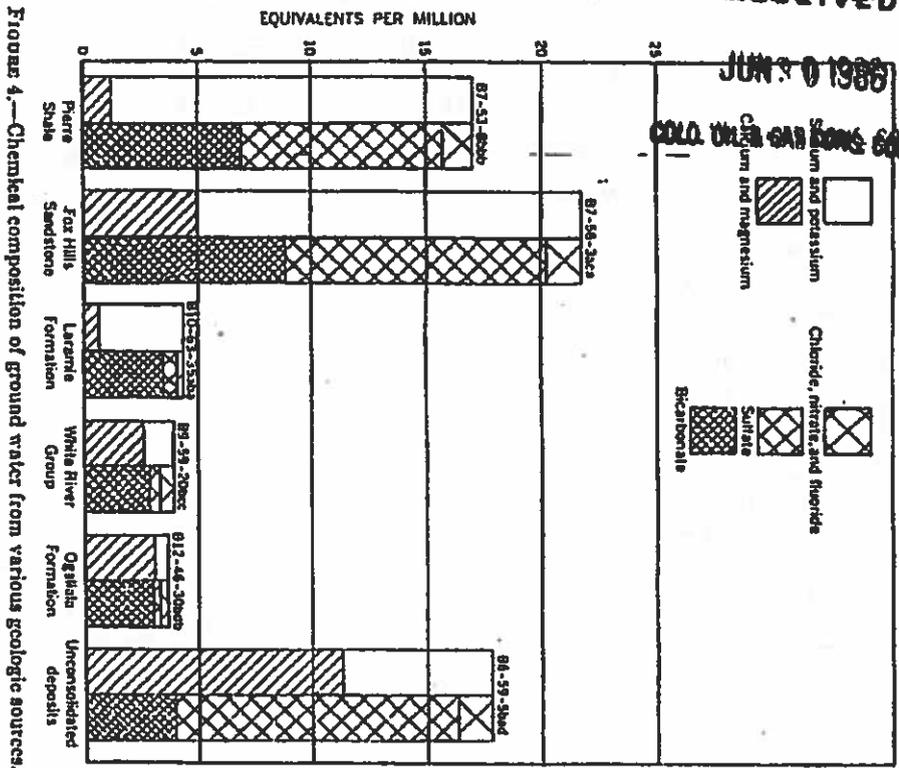


Figure 4.—Chemical composition of ground water from various geologic sources.

TABLE 3.—Maximum, minimum, and average concentrations of selected constituents in the ground water

Water-bearing zone	Bicarbonate (HCO ₃)			Sulfate (SO ₄)			Hardness as CaCO ₃		
	Max.	Min.	Avg.	Max.	Min.	Avg.	Max.	Min.	Avg.
Unconsolidated deposits.....	67	204	313	1,210	21	642	908	152	625
Ogishka Formation.....	217	178	203	117	6.6	14	184	140	183
White River Group.....	356	182	216	418	8.3	147	208	82	153
Laramie Formation.....	312	150	250	63	22	44	191	12	75
Fox Hills Sandstone.....	302	392	410	1,200	40	603	152	30	211
Pierre Shale.....	153	415	604	430	2.7	129	132	10	71
Water-bearing zone									
	Sodium (Na)			Percent sodium			Specific conductance (micromhos per cm at 25° C)		
	Max.	Min.	Avg.	Max.	Min.	Avg.	Max.	Min.	Avg.
Unconsolidated deposits.....	434	12	163	63	13	25	3,000	420	1,000
Ogishka Formation.....	23	0.4	15	23	11	16	628	210	268
White River Group.....	163	12	41	73	10	43	1,250	207	647
Laramie Formation.....	100	21	100	91	21	79	638	111	564
Fox Hills Sandstone.....	672	83	274	50	14	82	2,020	425	2,200
Pierre Shale.....	515	225	259	50	60	82	4,870	1,010	1,700

PIERRE SHALE

Analyses of four water samples from the Pierre Shale indicate that the water is generally of the sodium bicarbonate type and has a moderate dissolved-solids content. Except for the sample of water from well B8-53-17dc, which had a specific conductance of 4,570 micromhos, the range of specific conductance was from 1,010 to 1,650 micromhos. The water from well B8-53-17dc had a chloride content of 508 ppm (parts per million).

The water from well B7-53-8bbb had a sulfate content of 426 ppm. The high sulfate probably comes from gypsum or oxidized sulfide minerals in weathered parts of the shale.

CHEMICAL ANALYSIS OF FRESH WATER NEXT BELOW THE RETAINING PIT.

The adjacent Fluharty water well indicates that the underlying fresh water zone occurs within the Pierre shale fm. Fresh waters of Pierre shale fm of this area are described in the U.S.G.S. Water supply Paper 1809-L(1965). The above information is taken from that report.



LEWIS & CLARK EXPLORATION COMPANY
2770 DOME TOWER
1625 BROADWAY
DENVER, COLORADO 80202 • PHONE (303) 825-2444

June 27, 1986

RECEIVED

Colorado Oil and Gas Commission
1580 Logan St. Ste. 380
Denver, Colorado 80203

JUN 30 1986

Attn: Mac McDowell

COLORADO OIL & GAS COM. COMM.

Re: Pit Permit Application
Arco-Sindt #6-15 Well
Padroni West Field
Logan Co, Colorado

Attached is OGCC Form 15 pit permit application with supplementary material for the subject well.

Your review and response will be most appreciated.

Very truly yours,

Donald R. Hembre

GEN-10-033A

Appendix C



STATE OF COLORADO
D GAS CONSERVATION COMMISSION
Department of Natural Resources

RECEIVED

OCT 8 1971

APPLICATION FOR PERMIT TO USE EARTHEN PIT

COLO. OIL & GAS CONS. COMM.

1. CHECK ONE: NEW PIT EXISTING PIT TREATMENT FACILITY OTHER

2. NAME OF OPERATOR
~~Atlantic Richfield Company~~ Hondo Padroni West

3. ADDRESS OF OPERATOR
1860 Lincoln St., Suite 501, Denver, Colorado 80203 PHONE NO. 303/266-2400

4. LEASE NAME Francis Parke 5. PRODUCING FORMATION "O" Sand 6. GROUND ELEVATION 4046'

7. LOCATION (Report location clearly to the nearest 10 acres)
SW NW NE Sec. 6-T9N-R52W 8. COUNTY Logan 9. STATE Colorado

10. SIZE OF PIT:
LENGTH 375 FT. WIDTH 60 FT. DEPTH 6 FT.

11. CAPACITY 25,000 BBLs. 12. ESTIMATED INFLOW
Used for emergency only BIS/DAY

13. DISPOSAL OF PIT CONTENT:
HAULED _____ DISPOSAL WELL X EVAPORATION _____

14. MAXIMUM FLUID LEVEL ABOVE AVG. GROUND LEVEL 3 FT.

15. DRAINAGE DISTANCE IN FEET TO CLOSEST FRESH WATER POND, STREAM OR LAKE
To irrigation canal 2500 FT.

16. SUBSOIL TYPE
Pierre Shale

17. TYPE OF SEALING MATERIAL (Including specifications and Method of Application)
None

18. ADDITIONAL INFORMATION (By attachment include detailed plan of operation, chemical analysis of produced water, necessary maps, logs and other information as may be required by Rules 325 and 326 of the Rules and Regulations of the Oil and Gas Conservation Commission.)
See Attachments

PVR	
FJP	
HWA	✓
JAM	✓
JJD	

19. I HEREBY CERTIFY THAT THE FOREGOING IS TRUE AND CORRECT

SIGNED [Signature] TITLE Dist. Prod. & Drilg. Supt. DATE 10-8-71

THIS SPACE FOR COMMISSION USE

APPROVED BY [Signature] TITLE DIRECTOR DATE NOV 19 1971

CONDITIONS OF APPROVAL, IF ANY:
SEE ATTACHED MEMO



116258

MEMORANDUM

TO: D. V. Rogers

FROM: C. G. McDowell

On September 27, 1972, I drove to the Padroni West Field, Logan County.

Atlantic-F. Parke lease, NW NE 6-9N-52W. One pit 60' X 75' X 6', 100% covered oil, covered. One pit 70' X 75' X 6', 25% covered oil, covered. One pit 120' X 75' X 6', clean, water. TDS 6,134 per test "O" Sand. Some water wells in the area. Nearest creek approximately one mile west. No alluvium. White River on surface. Top of Pierre Shale approximately 50'. Produced water is reinjected. No problem at this time.

6/18/73 - One wire covered skim pit, empty, clean.

5/2/74 - 1-large skim tank; Pit 1 - wire screen + pipe frame cover, clean water in bottom, no oil.

9/25/74 - 1-large skim tank
1-skim pit, 20x40, unlined, wire screen cover, empty, dry, clean, fenced.
Pit 1 - 30x60, unlined, uncovered, fenced, empty, dry, clean.

STATE OF COLORADO
DEPARTMENT OF NATURAL RESOURCES
OIL AND GAS CONSERVATION COMMISSION
Room 237 Columbine Building
1845 Sherman Street
Denver, Colorado 80203

Atlantic - Richfield - F. Parke

3-9-73

Gentlemen:

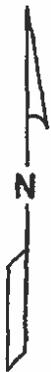
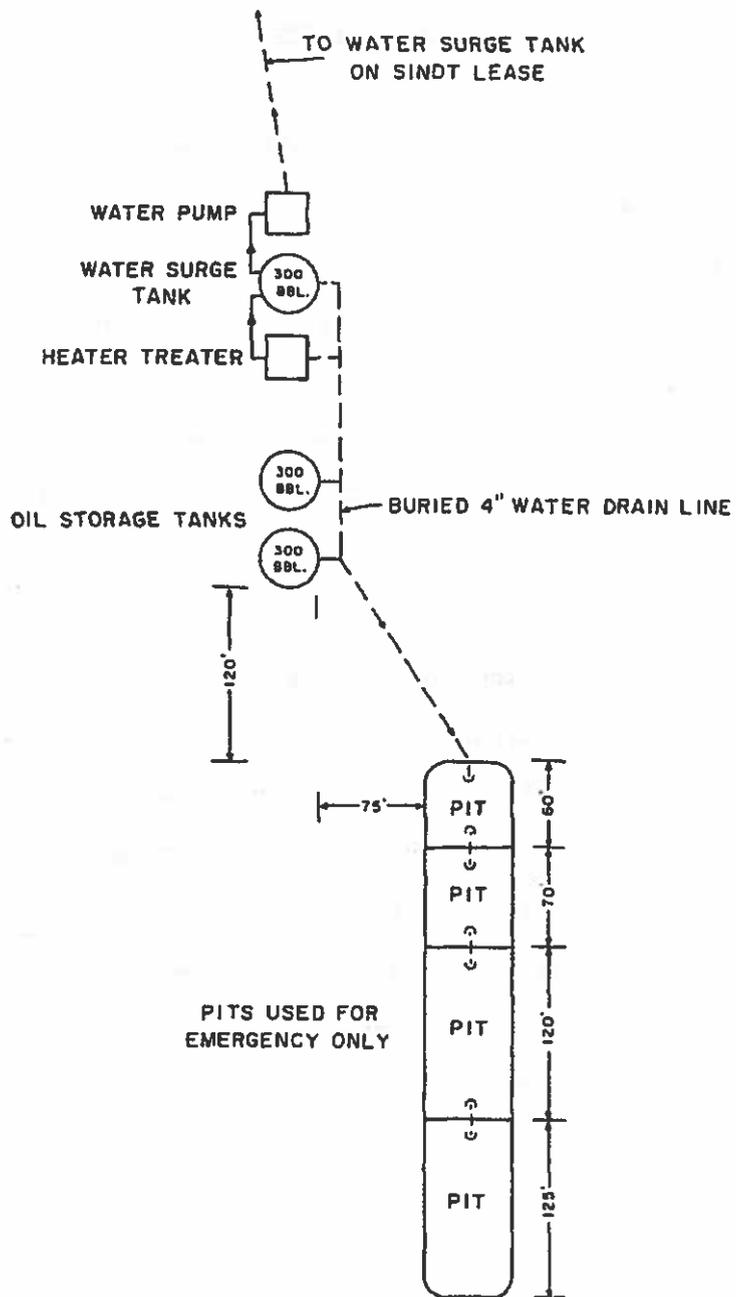
BU on *1/11 1972* a field inspection was made of the retaining pits at the above described lease. Your application, For Permit To Use Earthen Pit, *MAOCC Form 15* (cannot be approved) (approval is rescinded) because certain requirements of the rules and regulations must be met as checked below.

1. Removal of the oil accumulation on the surface of the produced water in the pit and maintenance of an oil-free pit in the future. (Rule 326)
2. Construction of a small skim pit or skimming facility to maintain an oil-free retaining pit. (Rule 325)
3. Underlying soil conditions require the retaining pit to be sealed or lined to prevent seepage. (Rule 326)
4. Other. _____

You are hereby given 60 days from receipt of this notice to correct the deficiencies or make application to this Commission for a hearing on the matter.

Very truly yours,

DV Rogers
Douglas V. Rogers
Director



Atlantic Richfield Company
 PART OF FRANCIS PARKE LEASE
 WEST PADRONI FIELD
 LOGAN COUNTY, COLORADO

DETAILED PLAN OF OPERATION

The Francis Parke Lease is located in the West Padroni Field in Logan County, Colorado. Atlantic Richfield is the Operator. There are two (2) producing wells on the lease. Total lease production is 27 BOPD and 500 BWPD. Treating facilities consist of two 300-barrel oil storage tanks, a two stage heater treater and a 300-barrel water surge and oil skimming tank. The effluent is pumped from the water surge tank by a centrifugal pump to the Arthur Sindt Lease where it is injected into the Arthur Sindt No. 9 disposal well. The retaining pit is used for emergency only, such as the centrifugal pump being down for repairs or repairs to the injection pump on the Arthur Sindt Lease. Any effluent to the retaining pit, as the result of such down time is dissipated by evaporation.

On June 26, 1967, an application was made by the Sinclair Oil and Gas Company to the Colorado Oil and Gas Commission to inject produced water into the Arthur Sindt No. 9 from 4806 to 4829. A letter of authorization to inject produced water into the Arthur Sindt No. 9 was received by the Sinclair Oil and Gas Company from the Colorado Oil and Gas Commission on August 3, 1967. Atlantic Richfield Company is successor to Sinclair Oil and Gas Company.

MEMBER Atlantic Richfield Company LAB NO 6308-2 REPORT NO _____
 OPERATOR Atlantic Richfield Company LOCATION _____
 WELL NO Parke Lease FORMATION _____
 FIELD West Padroni INTERVAL _____
 COUNTY _____ SAMPLE FROM Production
 STATE Colorado DATE September 14, 1971

REMARKS & CONCLUSIONS: Clear water.

Cations			Anions		
	mg/l	meq/l		mg/l	meq/l
Sodium	2425	105.43	Sulfate	309	6.43
Potassium	31	0.79	Chloride	2170	61.19
Lithium	-	-	Carbonate	-	-
Calcium	13	0.65	Bicarbonate	2403	39.41
Magnesium	2	0.16	Hydroxide	-	-
Iron	absent	-	Hydrogen sulfide	absent	-
Total Cations 107.03			Total Anions 107.03		

Total dissolved solids, mg/l 6134
 NaCl equivalent, mg/l 5446
 Observed pH 7.8

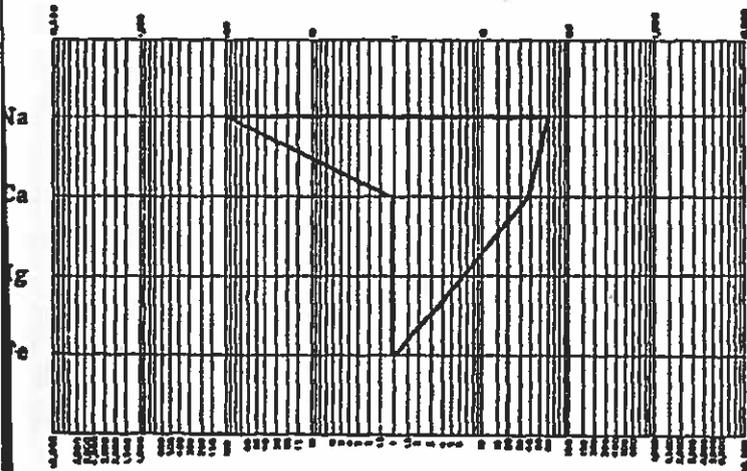
Specific resistance @ 68° F.:
 Observed 1.12 ohm-meters
 Calculated 1.15 ohm-meters

WATER ANALYSIS PATTERNS

MEQ per unit

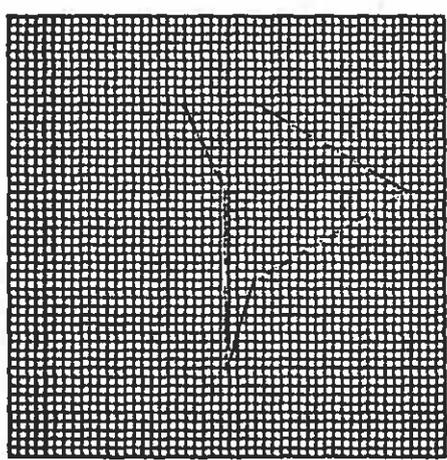
LOGARITHMIC

STANDARD



Cl
 HCO₃
 SO₄
 CO₃

Na
 20
 Ca
 2
 Mg
 2
 Fe
 2



Cl
 HCO₃
 SO₄
 CO₃

(Na value in above graphs includes Na, K, and Li)
 NOTE: Mg/l = Milligrams per liter. Meq/l = Milligram equivalents per liter
 Sodium chloride equivalent = by Dunlap & Hawthorne calculation from components

The three pits referred to, that Atlantic Richfield has in the West Padroni field, are located approximately as follows: SW NW, NE Sec. 6-9N-52W, NE SE SW Sec. 7-9N-52W, all in Logan County, Colorado.

Based on drillers logs of the seven closest water wells and several seismic shot holes, it is estimated that the pits are located in either top soil or the Tertiary White River Group. The top soil and/or the White River Group, approximately 15' - 30' thick, overlies the Pierre shale of Upper Cretaceous Age which is a dark impermeable shale containing lenses and stringers of clay sandstone.

The shot holes referred to above were drilled to depths of 100' to 150' in the Pierre shale with no water reported. The above mentioned water wells were drilled to depths of 231' to 335' in the Pierre shale with static water levels reported from 9' to 120'. The assumption is, therefore, made that these drilling depths were necessary to obtain sufficient quantities of water and that the source of water in these wells is the Pierre. On this basis, I would then estimate that the first source of appreciable water should be approximately 75' to 100' below the base of the pits.

This was discussed at some length with Mr. Richard Pearl, Hydrologist with the Colorado Geological Survey. Mr. Pearl was in agreement with the above conclusions and that, in his opinion, the subject pits should not be a source of contamination to the ground water.

M. F. Gravender

M. F. Gravender *By JEC*
Area Geologist
Atlantic Richfield Co.

MFG:bb

cc: Richard Pearl

Water Wells
Drillers Logs
Logan Co., Colorado

SESE 4-9N-52W	TD 321' Static WL 63' Csg: 6½" 0-92' Drawdown 157' Date Comp. Oct. 12, 1969	0.0- 1.5 Top 1.5- 7.5 Sd cly 7.5- 13.0 Cly 13.0- 35.0 Brule (gry) 35.0- 47.0 Blue Brule 47.0- 47.5 Rock 47.5- 68.0 Blue Brule 68.0- 90.0 Sh 90.0-111.5 Sh 111.5-112.0 Rock 112.0-127.0 Sh 127.0-127.5 Rock 127.5-147.0 Sh 147.0-147.5 Rock 147.5-167.0 Sh 167.0-168.0 Rock 168.0-196.0 Sh 196.0-196.5 Rock (hd) 196.5-205.0 Sh 205.0-205.5 Rock 205.5-219.5 Sh 219.5-221.0 Rock (hd) 221.0-254.0 Sh 254.0-257.0 Rock 257.0-282.0 Sh & some sd 282.0-283.0 Rock 283.0-305.0 Sh & some sd 305.0-306.0 Rock 306.0-314.0 Sh 314.0-315.0 Rock 315.0-321.0 Sh
SWNW 4-9N-52W	Comp. May 3, 1969 Static WL 12' TD 51' Drawdown 2' Perf. 26-51	0- 3 Top 3- 8 Cly & Sd 8-12.5 Grav, cly & sd 12.5- 17 Grav & a little cly 17- 30 Grav & Boulders 30- 34 Grav & cly 34- 52 Sh blossom 52-57 Sh
NW SE 4-9N-52W	Comp. December 1960 Domestic WL 32' Perf 60-76 TD 76'	0- 10 Top 10- 45 Sd & cly 45- 76 Cly

SE SW 6-9N-52W	Comp 7-6-67 Csg: 0-84 WL 40' Drawdown to 245 TD 250'	0- 5 Top soil 5- 20 Cly 20- 25 Sd 25- 55 Ylw sh (top KP?) 55-250 Blue sh & sd stgrs
NE NE 7-9N-52W	Comp. June 1965 Depth to wtr 9' Drawdown 150' Perf: 33-45 TD 245	0- 13 Sd 13- 66 Ylw cly 66-230 Blue sh 230-245 Sd sh
SE SE 7-9N-52W	Domestic Comp April 1964 Depth to wtr 32' Drawdown 100' TD 266' Csg 0-100 No perf csg	0- 2 Top 2- 18. Sd & grav 18- 35 Ylw sh 35- 80 Blk sft top sh 80-266 Blue sh
SE SW 7-9N-52W	Domestic Comp. February 1958 WL 35' Csg (plain) 0-125 TD 215'	0- 4 Top 4- 20 Cly 20- 25 Sd 25-105 Ylw sh 105-215 Gry sh w/stks sd
NW NE 8-9N-52W	Comp. July 8, 1967 Perf 50-60 WL 10' TD 60' Drawdown 4'	0- 2 Top 2- 8 Sd & cly 8- 13 Brule & grav 13- 34 Sh blossom & thn rock 34- 61 Sh
NE NE 8-9N-52W	Comp. October 31, 1964 WL 9' TD 40' Drawdown 30' Perf csg 8-40	0- 2 Top 2- 4 Loam 4- 7 Cly 7- 9 Sd 9-11.5 Gav & sd 11.5- 24 Brule cly & rock 24- 28 Sh blossom 28- 30 Sh 30- 31 Rock 31- 40
SE SE 8-9N-52W	Comp April 1964 WL 150 TD 310' Drawdown 310' Csg 0-73	0- 3 Top 3- 8 Cly 8- 19 Sd & grav 19- 34 Ylw cly 34-310 Blue sh

SE NW 9-9N-52W	Comp. December 2, 1964 WL 10' TD 40' Drawdown 30' Perf csg 10-40'	0- 2 Top 2- 6 Loam 6- 11 Sd & crs sd 11- 14 Grav & sd 14- 26 Brule cly 26- 40 Brule & thin rock
NW NW 9-9N-52W	Domestic Comp. November 15, 1961 WL 14' Drawdown 14' TD 37' Perf csg 15-37	0- 4 Top 4- 19 Grav sd & cly 19- 28 Cly 28- 29 Grav, sd & cly 29- 37 Brule sh blossom
NW NW 10-9N-52W	Domestic Comp. March 1964 WL 57' TD 201' Drawdown 120' Csg 0-96	0- 4 Top 4- 14 Sd & muck 14- 68 Cly 68-201 Sh
NE NE 19-10N-52W	Irrigation April 1965 Trench 70' long & 33' deep (TD 33')	0- 33 Brule cly
NE NE 19-10N-52W	Comp. April 16, 1962 WL 40' Drawdown 40' TD 180 Perf csg 40-80	0- 20 Top 20- 80 Gravel 80-160 Brule cly 160-180 Ylw sh
SE NE 1-9N-53W	Comp. April 1965 WL 10' TD 231' Drawdown 150' Perf csg 197-231	0- 20 Cly 20- 41 Ylw sh 41-150 Blue sh 150-152 Sh & sd stks 152-171 Sh 171-173 Sd 173-214 Sh 214-227 Sd 227-231 Sh
NW SW 2-9N-53W	Comp. March 1958 WL 25' Drawdown 50' Perf csg 175-200 TD 200'	0-160 ?? 160-200 sh

NE NE 10-9N-53W	Comp. August 30, 1960 WL 52' Drawdown 106' Perf csg 336-360 TD 360'	0- 3 Top 3- 12 Brule cly 12- 17 SS & brule 17- 44 Sh blossoms brule 44- 47 SS 47- 61 Sft brule sh 61- 64 Rock 64- 82 Brule sh 82- 84 Rock 84-104 Bl sh & some sd 104-105 Rock 105-123 Bl sh & some sd 123-124 Rock 124-140 Bl sh & some sd 140-141 Rock 141-182 Sh 182-256 Sh & some sd 256-258 Rock 258-282 Sh & sh sd
	282-324 Sh SS 324-360 Sh SS	
SW SE 12-9N-53W	Comp. July 1964 WL 100' TD 276' Csg 0-79 Drawdown 276	0- 2 Top soil 2- 6 Cly 6- 19 Sd & grav 19- 40 Cly 40-276 Sh
NW NE 13-9N-53W	Stock well Comp. July 1960 WL 40' TD 200' Perf csg 180-200	0- 15 Fg. sd 15- 35 Cly 35-200 Sh
SE NW 15-10N-53W	Stock Comp. April 1970 WL 160' TD 390' Perf csg 370-390 Drawdown 390'	0- 2 Top 2- 10 Sdy cly 10- 95 Ylw sh 95-390 Blue sh
NE SE 25-10N-53W	Stock Comp. November 1, 1966 Perf csg 10-62' WL 10' TD 62' Drawdown 52'	0- 2.5 Top 2.5-10 Sd & cly 10- 45 Brule 45- 61 Sh
SW NE 36-10N-53W	Stock Comp. December 1964 WL 120' TD 335' Drawdown 180 Csg 0-72	0- 3 Top 3- 8 Sdy cly 8- 56 Ylw sh 56-335 Blue sh

Appendix D



STATE OF COLORADO
 OIL & GAS CONSERVATION COMMISSION
 Department of Natural Resources

RECEIVED

NOV 24 1971

APPLICATION FOR PERMIT TO USE EARTHEN PIT FOR OIL & GAS CONS. COMM.

1. CHECK ONE: NEW PIT EXISTING PIT TREATMENT FACILITY OTHER

2. NAME OF OPERATOR W. C. McBride, Inc. KWB Oil Mount Hope east

3. ADDRESS OF OPERATOR 230 Denver Club Building, Denver, Colorado 80202 PHONE NO. 825-2366

4. LEASE NAME R. W. Davis 5. PRODUCING FORMATION 10" Sandstone 6. GROUND ELEVATION 4197

7. LOCATION (Report location clearly to the nearest 10 acres) NE SE NE Sec. 29-9N-53W 8. COUNTY Logan 9. STATE Colorado

10. SIZE OF PIT: LENGTH 100 FT. WIDTH 45 FT. DEPTH 6 FT.

11. CAPACITY 18,000 BBLs. 12. ESTIMATED INFLOW 290 BIS/DAY

13. DISPOSAL OF PIT CONTENT: HAILED _____ DISPOSAL WELL _____ EVAPORATION X

14. MAXIMUM FLUID LEVEL ABOVE AVG. GROUND LEVEL At Ground Level FT.

15. DRAINAGE DISTANCE IN FEET TO CLOSEST FRESH WATER POND, STREAM OR LAKE 6,000 FT.

16. SUBSOIL TYPE Clay

17. TYPE OF SEALING MATERIAL (Including specifications and Method of Application)
None

18. ADDITIONAL INFORMATION (By attachment include detailed plan of operation, chemical analysis of produced water, necessary maps, logs and other information as may be required by Rules 325 and 326 of the Rules and Regulations of the Oil and Gas Conservation Commission.)

19. I HEREBY CERTIFY THAT THE FOREGOING IS TRUE AND CORRECT

SIGNED David Paoli TITLE Production Supt. DATE 11-19-71

THIS SPACE FOR COMMISSION USE

APPROVED BY Mr. Rogers TITLE Director DATE MAR 21 1973

CONDITIONS OF APPROVAL, IF ANY:



116324

MEMORANDUM

TO: D. V. Rogers

FROM: G. S. McDaniel

On September 27, 1978, I drove to the Mount Hope East Field, Logan County.

Robertson, W. Davis lease, SE NE 29-9N-53W. One pit 45' X 45' X 6', clean, water. One pit 180' X 75' X 6', clean, water. One pit 165' X 45' X 6', clean, water. TDS 11,492 per test "G" Sand.

No water wells in the area. Nearest creek approximately 1/2 mile west. No elevation. White River on surface. Top of Pierre Shale approximately 50'. Recommend pits be lined or sealed.

10/3/74, GCH:

- 1 - SKIM pit, 10' x 6', wire screen cover, 100% oil
 - Pit 1 - ~ 75 X 85, shallow, unlined, uncovered, clean water in bottom, no oil.
 - Pit 2 - ~ 40 X 50, unlined, uncovered, shallow, 5% chemical scum, 95% clean water. Very slight oil rainbow with chem. scum.
 - Pit 3 - 40 X 75, unlined, uncovered, shallow, all clean water, no oil.
- (Pits 2 & 3 appear to be the active pits. Pit 1 is separated & appears to be a standb.

BO...
MADE IN U.S.A.

STATE OF COLORADO
DEPARTMENT OF NATURAL RESOURCES
OIL AND GAS CONSERVATION COMMISSION
Room 237 Columbine Building
1845 Sherman Street
Denver, Colorado 80203

McBride - R.W. Davis

Gentlemen:

12
On *1972* *sent 2/14/73*

a field inspection was made of the retaining pits at the above described lease. Your application, For Permit To Use Earthen Pit, OGCC Form 15 (cannot be approved) (approval is rescinded) because certain requirements of the rules and regulations must be met as checked below.

- 1. Removal of the oil accumulation on the surface of the produced water in the pit and maintenance of an oil-free pit in the future. (Rule 326)
- 2. Construction of a small skim pit or skimming facility to maintain an oil-free retaining pit. (Rule 325)
- 3. Underlying soil conditions require the retaining pit to be sealed or lined to prevent seepage. (Rule 326)
- 4. Other. _____

You are hereby given 60 days from receipt of this notice to correct the deficiencies or make application to this Commission for a hearing on the matter.

Very truly yours,

D.V. Rogers
Douglas V. Rogers
Director



RECEIVED

NOV 24 1971

ROCKY MOUNTAIN TECHNOLOGY, INC.
490 Orchard Street, Golden, Colorado 80401 • 303 279-4527

MINN. OIL & GAS CONS. COMM.

WATER ANALYSIS REPORT

Operator: W.C. McBride, Inc.

Date: November 5, 1971

Sample: W.C. Mc Bride, R.W. Davis #1
Sec. 29-9.S-53W, Logan County, Colo. (NE SE NE)
Treater Sample, "O"sand water produced with oil

Results are reported in parts per million
(ppm) except as indicated.

Analysis For

Calcium	35.4
Magnesium	7.8
Chloride	2775
Carbonate	40.1
Bicarbonate	1488
Sulfate	3885
Sodium	2700
pH	7.9
Resistivity (ohms)	7.3×10^1
Total Dissolved Solids	11492

Rocky Mountain Technology, Inc.

Gary C. Stebbins

Gary C. Stebbins
Project Manager

March 16, 1973

MEMO from Douglas V. Rogers

RE: Pit Permit, W. C. McBride, Davis Lease
SE $\frac{1}{4}$ NE $\frac{1}{4}$ Section 29, T. 9 N., R. 53 W., Logan County

After a discussion with M. C. Hoffman, we decided to approve the pit permit without requiring that the pits be lined. This decision was made because the cost of lining the pits would result in the premature abandonment of the well and the loss of badly needed oil reserves. There is no evidence of pollution.

MEMORANDUM

TO: D. V. Rogers

FROM: C. G. McDowell

March 12, 1973

SUBJECT: Re-evaluation of W. C. McBride, Inc., R. W. Davis lease in the SE NE 29-9N-53W, Logan county. The area concerned is the Mount Hope East Field.

On March 9, 1973, we received a letter from W. C. McBride, objecting to the retaining pits being sealed or lined. No oil accumulation was found when I inspected on September 27, 1972. However, the 3 pits did contain produced water. The water analysis per operator had a TDS 11,492 per test "O" Sand, which exceeds the safety tolerance for human and most domestic animal consumption and is also unfit for most crops. The estimated inflow to the pit is 290 barrels per day. The water is evidently seeping laterally, and the extent of the pollution would be difficult to estimate.

The nearest domestic water well lies 3,000 feet to the northwest, in the NE NW 29-9N-53W. This well was drilled to a total depth of 400 feet, has a TDS 922, but no log available. There are no registered water wells within a one mile radius.

The geology of the area is controversial. Geological Survey Water Supply Paper 1809-L shows the White River formation on the surface. The estimated thickness being 50-100 feet. Geological Survey Water Supply Paper 1378 shows the Pierre Shale with sandstone lenses on the surface.

Although there may have been no complaints from individuals concerning pollution problems, there is a favorable probability the problem will exist in the near future if past or present conditions are allowed to continue.

W. C. McBRIDE, INC.
230 Denver Club Building
DENVER, COLORADO 80202

RECEIVED

MAR 12 1973

HOME OFFICE
25 NORTH BREYWOOD BLVD.
ST. LOUIS, MO. 63105

COLO. OIL & GAS CONSV. COM. 11
225-2566

March 9, 1973



State of Colorado
Oil & Gas Conservation Commission
1845 Sherman St. Room 237
Denver, Colorado 80203

Attention: Mr. D. V. Rogers, Director

Re: R. W. Davis
NE $\frac{1}{4}$ SE $\frac{1}{4}$ NE $\frac{1}{4}$ Sec. 29
T9N-R53W
Logan County, Colo.

Gentlemen:

This letter is written in reply to your form letter of like caption dated February 14, 1973 disallowing, after 60 days, further use of produced water retaining pits for the R. W. Davis Well No. 1 under present conditions. Future use of these pits would be allowed only if they were first sealed or lined to prevent water seepage. We do not think that sealing or lining these pits would be economically feasible for reasons given below.

R. W. Davis No. 1, the only well on the lease, was completed in September, 1963 as a dual producer pumping 57 BOPD from the "O₂" Sandstone and producing gas from the practically depleted "J" sandstone for lease operations. Production presently averages about 11 BOPD with close to 300 BWP. The gas has been depleted from the "J", and gas is now purchased for lease operations. In 1972, oil production was 4137 barrels and cumulative production through 1972 was about 44,600 barrels. Operations were practically trouble-free during 1972 and resulted in a profit after expenses of about \$6,000 to the working interest owners. Oil production is declining at a rate of about 15 percent per year, so this well can be expected to produce profitably for about another three or four years under present conditions. Reserves based on present operating costs are about 11,000 barrels of oil.

From inspection of the ground surface in the vicinity of the Davis lease evaporation pits, we believe it is unlikely that downward seepage of water is occurring - rather, it is seeping laterally through and below the pit walls and evaporating from the surrounding soil as well as off the top of the pits. Because of the heavy precipitation in the vicinity this winter, the area surrounding the pits is unusually wet and the pits are quite full at this time. This will dry considerably in the summer and we have had no complaints from the farmer of the surrounding soil.

This is an isolated well, there being only one other well still producing in Section 29. That well is Gulf Oil Company's - Carey "B" Well No. 1, SW $\frac{1}{4}$ SE $\frac{1}{4}$, which still produces from the "O" sandstone. Therefore, there are no wells in

State of Colorado
March 9, 1973

the vicinity that potentially could be used for subsurface disposal of water.

In our opinion, there are three possible alternatives for the R. V. Davis lease regarding this produced water.

1. To be allowed to continue producing this property as is to economic limit followed by abandonment and clean-up of the land. This, of course, would be our choice because it would result in recovery of the most oil and at the highest profit before abandonment.

2. Sub-surface disposal of the "D₂" water into the depleted "J" sandstone with packer set between the two. This would entail an unknown expenditure of funds because the rate of imbibing of water by the "J" sandstone is unknown and could lead to the necessity of hydraulic fracturing and/or disposing of water under pressure. This property obviously could not support any large expenditure that might be required for treating and equipping.

3. Shutting down of the Davis Well No.1 at the expiration of the 60-day time limitation and abandonment of the property when weather permits. This would result in leaving the remaining oil reserves in the ground, and drilling for this relatively small amount of oil at some future time could probably never be justified because of economic factors.

If we can be of any further assistance in providing you with additional information or in clarifying anything in this letter, please advise.

Very truly yours,

W. C. McBRIDE, INC.



David Paoli, Prod. Supt.

NWE:pkm

cc: St. Louis Office
cc: Stuarco Oil Co.

MEMORANDUM

TO: D. V. Rogers.

FROM: C. G. McDowell

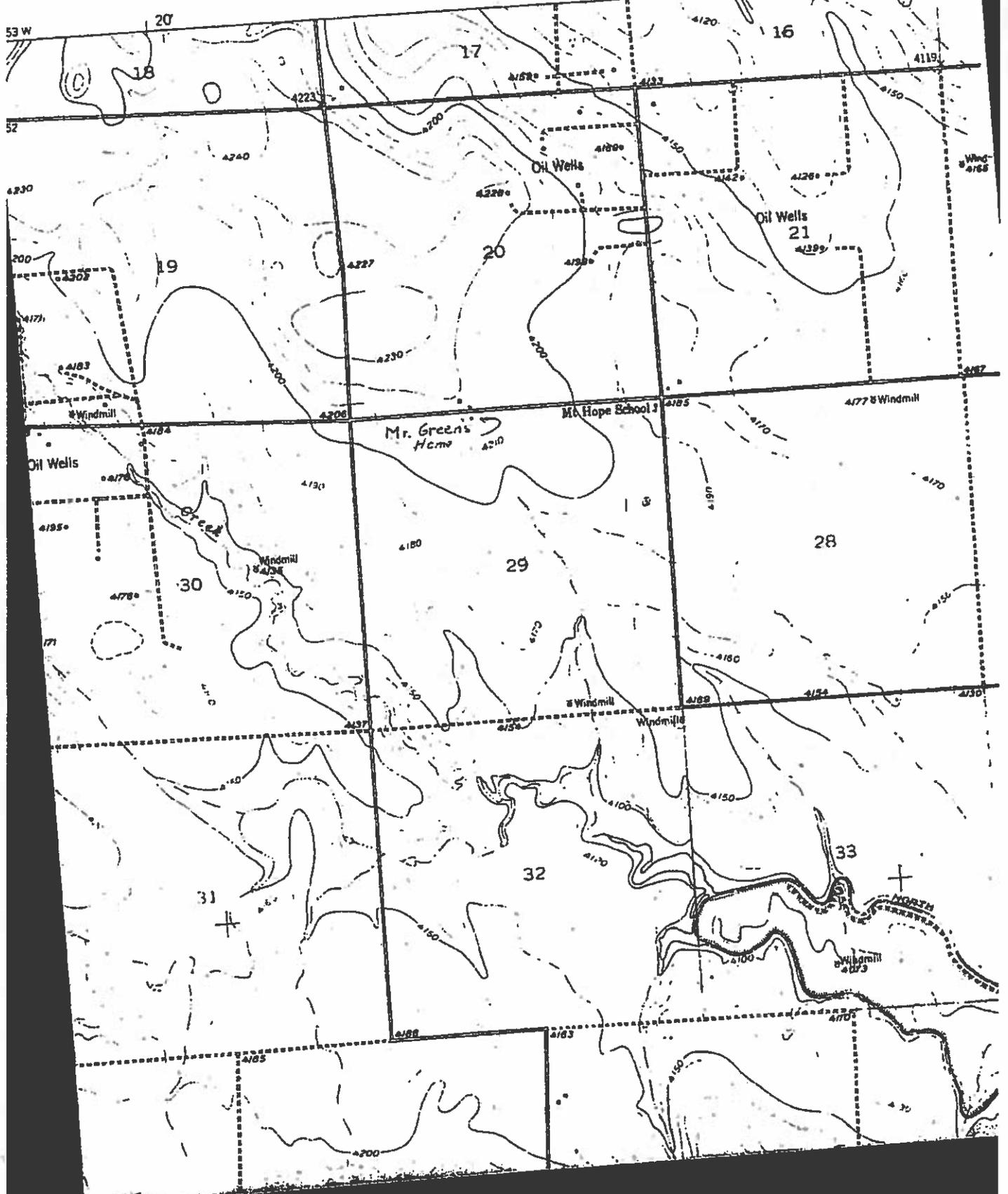
On September 27, 1972, I drove to the Mount Hope East Field, Logan County.

McBride-R. W. Davis lease, SE NE 29-9N-53W. One pit 45' X 45' X 6', clean, water. One pit 100' X 75' X 6', clean, water. One pit 165' X 45' X 6', clean, water. TDS 11,492 per test "O" Sand. Some water wells in the area. Nearest creek approximately $\frac{1}{4}$ mile west. No alluvium. White River on surface. Top of Pierre Shale approximately 50'. Recommend pits be lined or sealed.

*May 1974, 9261: 1-skip pit 8'sq., wire screen cover, 100% oil
Pit 1 - ~ 75'sq., uncovered, all clean water, no oil
Pit 2 - ~ 30x40, uncovered, all clean water, no oil
Pit 3 - ~ 30x100, uncovered, all clean water, no oil*

T9N-R53W RECEIVED
Logan County, Colo. NOV 24 1971

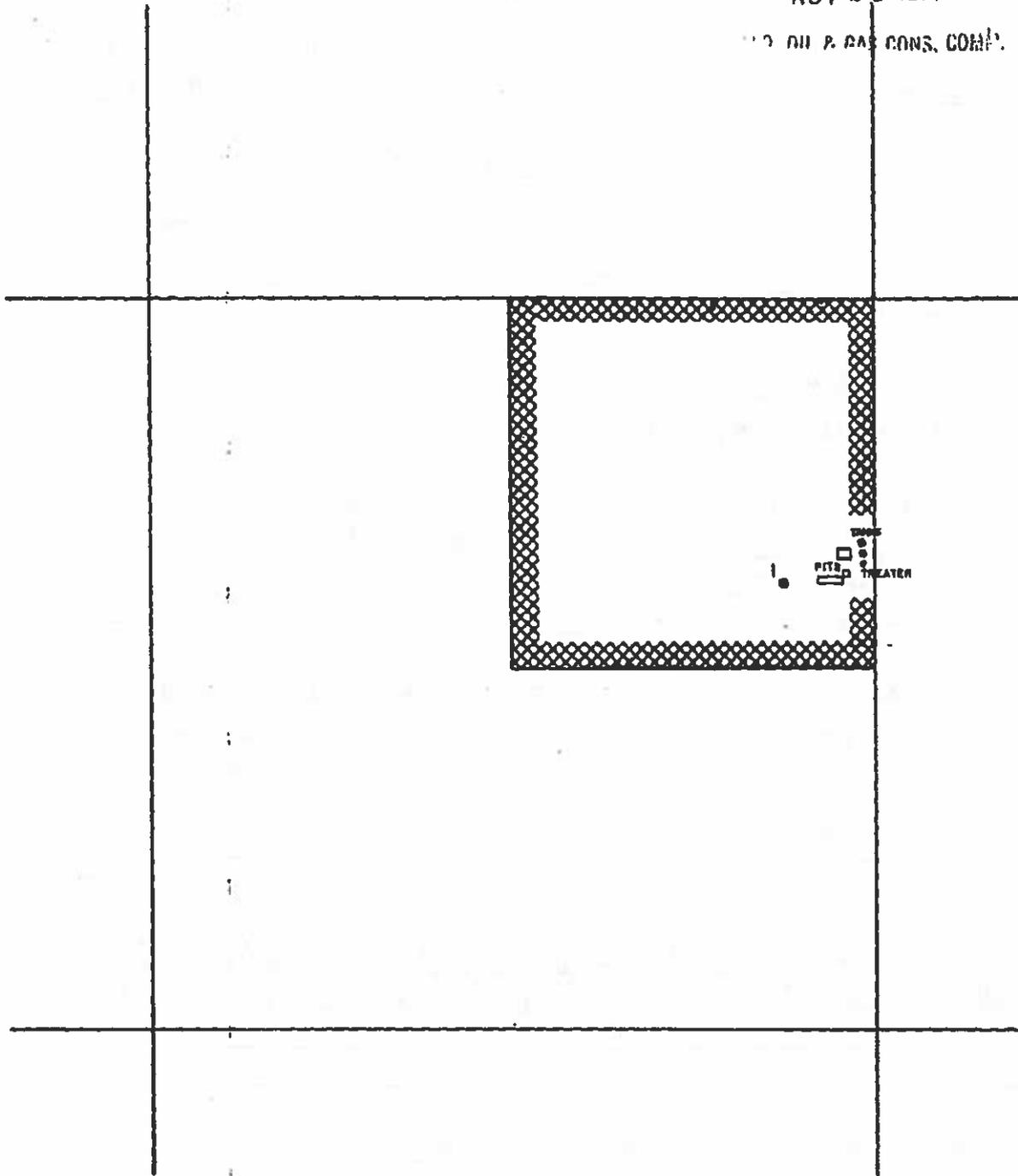
Oil & Gas Cons. Com.



RECEIVED

NOV 24 1971

OIL & GAS CONS. COMP.



Company: W.C. McBRIDE INC.
Lease Name: R.W. Davis
Location: Sec. 29 - T9 N - R53 W
County: Logan
State: COLORADO

PIT INSPECTION FORM



DATE 10/15/86 OPERATOR KWB... Oil FIELD Mt. Hope East
 COUNTY Logan LEASE Davis #1 LOCATION SENE 29-9N-53W

CLASS 3-b LEASE SIGN: YES NO TANK ID: YES NO

TYPE OF OBSERVED WATER DISPOSAL: (2) 300 Barrels
 EVAP. PITS TANKS/TRUCKED INJECTED* NOT-DETERMINED NA
 ESTIMATED WATER PRODUCTION _____ GPM * (34.3) = _____ BPD

SKIM TANK: SIZE 1000 GALS (2) METAL FIBERGLASS PLASTIC CEMENT
 COVERED YES NO, OVERFLOW YES NO

PITS:	SKIM PIT(S)	EVAPORATIVE PIT(S)
SIZE:	<u>15 * 15 =</u> _____ SOFT	<u>40 * 40 =</u> _____ SOFT
MATERIAL	<u>Native soil.</u> _____	<u>50 * 90 =</u> _____ SOFT
SCREEN:	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	<u>40 * 50 =</u> _____ SOFT
SCREEN COLLAPSED	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	TOTAL = _____ SOFT
FLAGS	<input type="checkbox"/> YES <input type="checkbox"/> NO	LINER MATERIAL: COMM. BENT. _____
OIL COVERED	<u>100 %</u>	SYNTHETIC _____
		NATIVE SOIL <input checked="" type="checkbox"/>
		NONE _____
		OIL COVERED <u>0 %</u>
		BREACHED <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO

0-Sand

COMMENTS Wtr. appears to seep out of pits and pool on location
between pumpjack and tanks. Well is producing (oil like tar)

PIT PERMIT YES NO, LINER REQUIRED YES NO, TDS _____ ppm
 REPORTED WATER PRODUCTION ~265 BBL/DAY LEASE NUMBER 32129
 *INJECTION FACILITY: NAME _____ LOCATION _____

NOTICE SENT YES NO DATE SENT _____ INSPECTOR S. Pott



NEW WELL

LEASE INSPECTION FORM

DATE 1-17-90 OPERATOR DONNELLY FIELD MT. HOPE.
COUNTY LOGAN LEASE DAVIS #1 LOCATION SE-NE 29-9N-53W-
WELLS & STATUS 1 O & G Produced
CLASS 3- LEASE SIGN: YES NO TANK ID: YES NO NA

TYPE OF OBSERVED WATER DISPOSAL:

EVAP. PITS TANKS/TRUCKED INJECTED* NOT DETERMINED NA

ESTIMATED WATER PRODUCTION 150-200 BPD.

JERRY ARNOLD

BRADENHEAD PRESSURE 1/4 FLUID: NO YES TYPE

STOCK TANKS 2-210 BBL, 2-300 BBL

EQUIPMENT VERT. TREATER

SKIM TANK/PIT 2 CONCRETE SILDS.

PITS 3 EARTHEN PITS

CONDITION OF LEASE OK

RECOMMENDED ACTION REPORT WATER PROD.

PIT PERMIT YES NO, LINER REQUIRED YES NO, TDS 11129 ppm

REPORTED WATER PRODUCTION 200+ BBL/DAY LEASE NUMBER 3210 32129

*INJECTION FACILITY: NAME LOCATION

NOTICE SENT YES NO DATE SENT 1-25-90 INSPECTOR R. Vandenberg

0 BWPD reported from Jul.-Oct. 89 even though the well produced all but 1 day

Requested production reports on water 1-25,

Appendix E

OIL



99999999

SION

Department of Natural Resources

Lse # 31001
RECEIVED

JUN 18 1980

APPLICATION FOR PERMIT TO USE EARTHEN PIT

OIL & GAS CONSERVATION COMMISSION

1. CHECK ONE:

NEW PIT

EXISTING PIT

TREATMENT FACILITY

OTHER

2. NAME OF OPERATOR

Rex Monahan (Logan)

3. ADDRESS OF OPERATOR

Box 1231 Sterling, Colo. 80751

PHONE NO.

522-0774

4. LEASE NAME

Duncan #1

5. PRODUCING FORMATION

Habata J

6. GROUND ELEVATION

4336

7. LOCATION (Report location clearly to the nearest 10 acres)

Ne NW Sec-27-8N-54West

8. COUNTY

Logan

9. STATE

Colo

10. SIZE OF PIT:

LENGTH 120 FT.

WIDTH 790 FT.

DEPTH 15 FT.

11. CAPACITY

30,000 BBLS.

12. ESTIMATED INFLOW

20 BIS/DAY

13. DISPOSAL OF PIT CONTENT:

HAULED

DISPOSAL WELL

EVAPORATION

X

14. MAXIMUM FLUID LEVEL ABOVE AVG. GROUND LEVEL

None FT.

15. DRAINAGE DISTANCE IN FEET TO CLOSEST FRESH WATER POND, STREAM OR LAKE

3 miles FT.

16. SUBSOIL TYPE

Sandy Loam

17. TYPE OF SEALING MATERIAL (Including specifications and Method of Application)

Aquafel

18. ADDITIONAL INFORMATION (By attachment include detailed plan of operation, chemical analysis of produced water, necessary maps, logs and other information as may be required by Rules 325 and 326 of the Rules and Regulations of the Oil and Gas Conservation Commission.)

19. I HEREBY CERTIFY THAT THE FOREGOING IS TRUE AND CORRECT

SIGNED

[Signature]

TITLE

Operator

DATE

6-12-80

THIS SPACE FOR COMMISSION USE

APPROVED BY

[Signature]

DIRECTOR

TITLE

O & G Cons. Comm.

DATE

JAN 27 1983

CONDITIONS OF APPROVAL, IF ANY:

SEE ATTACHED MEMO



00706336

(112003)

COLORADO OIL AND GAS CONSERVATION COMMISSION
Room 721, State Centennial Building
1313 Sherman Street
Denver, Colorado 80203

MEMO

TO: D. V. Rogers

January 26, 1983

FROM: R. C. Campbell

SUBJECT: Evaluation of Retaining Pits

On January 25, 1983, an evaluation was made of the retaining pits in the Pawnee Creek North Field, Logan County.

Rex Monahan
Duncan Lease, NENW 27-8N-54W

This well produces oil from the Dakota formation and the "J" sand. The pit is 120'x120'x15', with an estimated inflow of 20 barrels per day of produced water. The water analysis indicates a TDS of 4237 ppm.

The area is covered by Eolian deposits, underlain by the upper unit of the Pierre Shale.

There are a few water wells in the area and the nearest stream or drainage is one mile distant.

The uncovered pit should be kept free of oil accumulation.

RECEIVED
JUL 13 1980
OIL & GAS COMM.



DIVISION LABORATORY
Box 2400 Casper, Wyoming 82602

Date May 30, 1980

To Mr. W. C. Maddox
Halliburton Services
Sterling, Colorado

Report No. 18065

Submitted By Rex Monahan Date Received May 30, 1980

Well No. 1 Duncan 27-8N-54W

Location Logan County, Colorado Formation J Sand

Specific Gravity 1.001

pH 8.2

Iron (FE) Less than 1

Potassium (K) -

Sodium (Na) -

Calcium (CA) 1

Magnesium (Mg) 1

Chlorides (Cl) 759

Sulfates (SO⁴) 212

Carbonates (CO³) Nil

Bicarbonates (HCO³) 3,264

Total Dissolved Solids -

Rw 1.8

This report is the property of Halliburton Services, a Division of Halliburton Company, and neither this report nor any part hereof may be disclosed to any third party without the express written approval of Halliburton Services.

MILLIGRAMS PER LITER

Ohms/m²/m at 74 °F

Remarks:

cc Mr. W. P. Renner
Mr. R. H. Cunningham

Respectfully submitted,
HALLIBURTON SERVICES

By Francis C. Kent

NOTICE: This report is for information only and the content is limited to the sample described. Halliburton makes no warranties, express or implied, as to the accuracy of the contents or results. See back of this report for more details.

STATE OF COLORADO
OIL AND GAS CONSERVATION COMMISSION
DEPARTMENT OF NATURAL RESOURCES
Rm. 721, State Centennial Building
1313 Sherman Street
DENVER, COLORADO 80203

D. V. ROGERS
Director

(303) 892-3531

RICHARD D. LAMM
GOVERNOR

FRANK J. PIRO
Deputy Director

May 23, 1980

Rex Monahan
Box 1231
Sterling, CO 80751

Gentlemen:

A check of our records indicates that we have not issued a pit permit on the following lease: Duncan, NE NW 27-8N-54W, Logan Field, Logan County, Colorado.

/ 24 hour test indicates 20 Bbls. water.

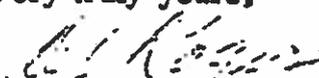
The use of open pits is governed by Rule #328 of the Rules and Regulations of the Oil and Gas Conservation Commission ... "For retaining pits constructed after August 1, 1971 ... no retaining pit shall be constructed without a permit from this Commission". This applies to all pits except those used for temporary storage and disposal of fluids produced in the initial completion and testing of an oil or gas well. Operators of retaining pits in operation prior to August 1, 1971 may continue such operation, but must have applied to the Director for a permit before November 1, 1971.

The application for this pit is not on file and may not have been received by the Commission; as such, it is in violation of Rule #328, and therefore subject to penalties and fines as outlined in the Oil and Gas Conservation Act.

Please fill out and return to this office the attached permit application with an analysis of your produced water indicating the total dissolved solids. If your records indicate that you have an approved permit, please disregard this notice and mail a copy of the permit to this office.

Your immediate attention to this matter is requested at this time.

Very truly yours,


Douglas V. Rogers
Director

DVR:RLS:bm
Enc.

DEPARTMENT OF NATURAL RESOURCES
OF THE STATE OF COLORADO

RECEIVED
MAY 12 1980

PRODUCER'S CERTIFICATE OF CLEARANCE AND AUTHORIZATION
TO TRANSPORT OIL OR GAS FROM A WELL

COLO. OIL & GAS CONSV. COMM.

File in triplicate for Patented and Federal lands.
File in quadruplicate for State lands.

Lease Duncan Well No. 12 Field Logan

Loc. NE NW Sec. 27 Twp. 8 North Range 54 West County Logan
1/4

Producing Formation "J"

Producer or Operator Rex Monahan Phone No. 522-0774

Street Box 1231 City Sterling State Colorado Zip 80751

The above named producer hereby authorizes the following transporter (s) to transport oil and/or gas from the above designated well:

OIL

GAS

Transporter Union Oil Company of California

Street 1700 Broadway Room 1106

City Denver, Colorado 80202

State _____ Zip _____

Date of First Production 5-6-80

Transporter _____

Street _____

City _____

State _____ Zip _____

Date of First Sales _____

If change of Operator:
Previous Operator _____ Effective date of change _____

REMARKS _____

DWR
F&P
REG
ISS
JJD
RLS
OC

NEW WELL TEST DATA

Production gauge on 24 hr. basis 3 Bbl. Oil 20 Bbl. Water TSTM Mcf. Gas

The undersigned certifies that the rules and regulations of the Oil and Gas Conservation Commission of the State of Colorado have been complied with except as noted above and that the transporter (s) is (are) authorized to transport the oil and/or gas produced from the above described well and that this authorization will be valid until further notice to the transporter named herein or until cancelled by the Colorado Oil and Gas Conservation Commission.

Executed this 8th day of May, 19 80

Approved _____

Date _____

Rex Monahan
(Producer or Operator)

(Affiant)

(Affiant)



00706340

REC
6

LEASE INSPECTION FORM

Operator Lex Morahan Date 7/15/15
 Lease Name & No. Duncan 1 Field Logan OK
 Tank Battery No. 8N-54-C-27 County Logan OK
 Location _____ Legal Description _____

Type of Inspection _____
 Water Inflow _____ (Bbls. Per Day)

RESULTS OF INSPECTION

(Est. Pit Dimensions, CVD, Lined, Oil on Surface, etc.)
 Type of Tank

SKIM TANK _____

Pit No. 1 10X10 - Clear cover - covered - 7' Full

Pit No. 2 80X80 - Clear - 8' Full

Pit No. 3 _____

ADDITIONAL PITS _____

CONDITION OF LEASE (Describe - Oil CVD. or Sat. Gr., Any Leaking, Safety Conditions, Etc.)
OK

RECOMMENDED ACTION (If Required) _____

INSPECTOR AVB

COLORADO OIL AND GAS CONSERVATION COMMISSION
Room 721, State Centennial Building
1313 Sherman Street
Denver, Colorado 80203



MEMO

TO: D. V. Rogers
FROM: R. C. Campbell
SUBJECT: Evaluation of Retaining Pits

On July 30, 1981 an evaluation was made of retaining pits in Logan Field,
Logan County

Rex Monahan
1 Duncan
NE NW 27-8N-54W

This well produces gas from the "J" sandstone. The retaining pit has dimensions of 115'x121'x5.5' with an inflow of 38 barrels of produced water per day with a water analysis indicating total dissolved solids (TDS) of 4,238 PPM. The distance to the nearest stream is one mile. There are some wells in the area due to the fringe development around Sterling. The Peoria Loess outcrops here underlain by the upper limit of the Pierre shale.

All uncovered pits should be kept free of oil accumulation.

COLORADO OIL AND GAS CONSERVATION COMMISSION
Room 721, State Centennial Building
1313 Sherman Street
Denver, Colorado 80203

MEMO

TO: D. V. Rogers
FROM: R. C. Campbell
SUBJECT: Evaluation of Retaining Pits

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Rex Monahan
1 Duncan
NE NW 27-8N-54W

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All uncovered pits should be kept free of oil accumulation.

STATE OF COLORADO
OIL AND GAS CONSERVATION COMMISSION
Department of Natural Resources

RECEIVED
NOV 14 1980

APPLICATION FOR PERMIT TO USE EARTHEN PIT COLO. OIL & GAS CONS. COMM.

1. CHECK ONE: NEW PIT EXISTING PIT TREATMENT FACILITY OTHER

2. NAME OF OPERATOR
Rex Monahan *Logan*

3. ADDRESS OF OPERATOR P. O. Box 1231, Sterling, Colorado
PHONE NO. 522-0774

4. LEASE NAME Duncan 5. PRODUCING FORMATION "J" *Gas* 6. GROUND ELEVATION 4327'

7. LOCATION (Report location clearly to the nearest 10 acres) NE NW/4 of Section 27-8N-54W 8. COUNTY Logan 9. STATE Colorado

10. SIZE OF PIT: LENGTH 115 FT. WIDTH 121 FT. DEPTH 5 1/2 FT.

11. CAPACITY 13,592 BBLs. 12. ESTIMATED INFLOW 38 BIS/DAY

13. DISPOSAL OF PIT CONTENT: HAILED _____ DISPOSAL WELL _____ EVAPORATION X

14. MAXIMUM FLUID LEVEL ABOVE AVG. GROUND LEVEL 2 FT.

15. DRAINAGE DISTANCE IN FEET TO CLOSEST FRESH WATER POND, STREAM OR LAKE 18,000 FT.

16. SUBSOIL TYPE Sandy Loam

17. TYPE OF SEALING MATERIAL (Including specifications and Method of Application)
None

18. ADDITIONAL INFORMATION (By attachment include detailed plan of operation, chemical analysis of produced water, necessary maps, logs and other information as may be required by Rules 325 and 326 of the Rules and Regulations of the Oil and Gas Conservation Commission.)

DWR
R/P
HHH
JAN
JJD
RLS
CBM

19. I HEREBY CERTIFY THAT THE FOREGOING IS TRUE AND CORRECT
SIGNED *Rex Monahan* TITLE Operator DATE 11-13-80

THIS SPACE FOR COMMISSION USE
APPROVED BY _____ TITLE _____ DATE _____
CONDITIONS OF APPROVAL, IF ANY:

RECEIVED

JUL 12 1980

... .. OIL CONS. COMM.



DIVISION LABORATORY
Box 2400 Casper, Wyoming 82602

Date May 30, 1980

To Mr. W. C. Maddox

Report No. 18065

Halliburton Services

Starling, Colorado

Submitted By Rex Monahan Date Received May 30, 1980

Well No. 1 Duncan 27-8N-54W

Location Logan County, Colorado Formation J Sand

Specific Gravity 1.001

pH 8.2

Iron (FE) Less than 1

Potassium (K) -

Sodium (Na) -

Calcium (CA) 1

Magnesium (Mg) 1

Chlorides (Cl) 759

Sulfates (SO⁴) 212

Carbonates (CO³) Nil

Bicarbonates (HCO³) 3,264

Total Dissolved Solids -

Rw 1.8

This report is the property of Halliburton Services, a Division of Halliburton Company, and neither this report nor any part hereof may be disclosed to any third party without the express written approval of Halliburton Services.

MILLIGRAMS PER LITER

Ohms/m²/m at 74 °F

Remarks:

cc Mr. W. P. Renner
Mr. R. M. Cunningham

Respectfully submitted,
HALLIBURTON SERVICES

By Francis C. Keel

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STATE OF COLORADO
OIL AND GAS CONSERVATION COMMISSION
DEPARTMENT OF NATURAL RESOURCES
Rm. 721, State Centennial Building
1313 Sherman Street
DENVER, COLORADO 80203

D. V. ROGERS
Director

(303) 892-3531

RICHARD D. LAMM
GOVERNOR

FRANK J. PIRO
Deputy Director

May 23, 1980

Rex Monahan
Box 1231
Sterling, CO 80751

Gentlemen:

A check of our records indicates that we have not issued a pit permit on the following lease: Duncan, NE NW 27-8N-54W, Logan Field, Logan County, Colorado.

/ 24 hour test indicates 20 Bbls. water.

The use of open pits is governed by Rule #328 of the Rules and Regulations of the Oil and Gas Conservation Commission ... "For retaining pits constructed after August 1, 1971 ... no retaining pit shall be constructed without a permit from this Commission". This applies to all pits except those used for temporary storage and disposal of fluids produced in the initial completion and testing of an oil or gas well. Operators of retaining pits in operation prior to August 1, 1971 may continue such operation, but must have applied to the Director for a permit before November 1, 1971.

The application for this pit is not on file and may not have been received by the Commission; as such, it is in violation of Rule #328, and therefore subject to penalties and fines as outlined in the Oil and Gas Conservation Act.

Please fill out and return to this office the attached permit application with an analysis of your produced water indicating the total dissolved solids. If your records indicate that you have an approved permit, please disregard this notice and mail a copy of the permit to this office.

Your immediate attention to this matter is requested at this time.

Very truly yours,


Douglas V. Rogers
Director

DVR:RLS:bm
Enc.

DEPARTMENT OF NATURAL RESOURCES
OF THE STATE OF COLORADO

RECEIVED

MAY 12 1980

PRODUCER'S CERTIFICATE OF CLEARANCE AND AUTHORIZATION
TO TRANSPORT OIL OR GAS FROM A WELL

COLO. OIL & GAS CONSV. COMMISSION

File in triplicate for Patented and Federal lands.
File in quadruplicate for State lands.

Lease Duncan Well No. 4 Field Logan
Loc. NE NW Sec. 27 Twp. 8 North Range 54 West County Logan
1/4 1/4
Producing Formation "J"
Producer or Operator Rex Monahan Phone No. 522-0774
Street Box 1231 City Sterling State Colorado Zip 80751

The above named producer hereby authorizes the following transporter (s) to transport oil and/or gas from the above designated well:

OIL

GAS

Transporter Union Oil Company of California
Street 1700 Broadway Room 1106
City Denver, Colorado 80202
State _____ Zip _____
Date of First Production 5-6-80

Transporter _____
Street _____
City _____
State _____ Zip _____
Date of First Sales _____

DVR
RJP
HRM
JAM
JJD
RLS
CCAS

If change of Operator:
Previous Operator _____ Effective date of change _____

REMARKS _____

NEW WELL TEST DATA

Production gauge on 24 hr. basis 3 Bbl. Oil 20 Bbl. Water TSTM Mcf. Gas

The undersigned certifies that the rules and regulations of the Oil and Gas Conservation Commission of the State of Colorado have been complied with except as noted above and that the transporter (s) is (are) authorized to transport the oil and/or gas produced from the above described well and that this authorization will be valid until further notice to the transporter named herein or until cancelled by the Colorado Oil and Gas Conservation Commission.

Executed this 8th day of May, 19 80

Approved _____

Date _____ (Producer or Operator)

_____ (Allison)

P: + 112 003

FOR OGCC USE ONLY

SUNDRY NOTICE

This form is to be used for general, technical and environmental sundry information. For proposed or completed operations, describe in full on Technical Information Page (back of this form).



Attachment Checklist

1. OGCC Operator Number: 59100	4. Contact Name & Phone
2. Name of Operator: Rex Monahan	James Rowland
3. Address: P.O. Box 1231	No: (970) 522-0274
City: Sterling State: CO Zip: 80751	Fax: (970) 522-8744
5. API Number: 05- 075087120	6. OGCC Lease No: 751001
7. Well Name: Duncan	Number: 1 (Associated pit.)
8. Location (Ctr/Qtz, Sec, Twp, Rng, Meridian): NE NW Sec. 21-T8N-R54W	
9. County: Logan	10. Field Name:
11. Federal, Indian or State lease number:	

	OGCC
Survey Plat	
Directional Survey	
Surface Equipment Diagram	
Technical Information Page	
Other	

General Notice

12.

Change well name from _____ to _____ Effective Date: _____

Change of location from _____
Attach new survey plat. to _____

Abandoned Location. Is site ready for inspection? Yes No Effective Date: _____
Was location ever built? Yes No Permit No: _____

Well first shut in or temporarily abandoned _____ Notice of continued shut-in status.
Has production equipment been removed from site? Yes No
MIT required if shut in longer than two years. Date of last MIT: _____

Well resumed production on _____

Request for Confidential Status (6 months).

Final reclamation will commence approximately on _____

Final reclamation is completed and site is ready for inspection. Attach technical page describing final reclamation procedures per Rule 1000c.4

Change of Operator (prior to drilling). Effective Date: _____ Plugging bond: Blanket Individual

Spud Date _____

Technical Engineering/Environmental Notice

13.

Notice of Intent Approximate Start Date: _____ Report of Work Done Date Work Completed: Sept. 10, 1997

Details of work must be described in full on Technical Information Page (Page 2 must be submitted).

<input type="checkbox"/> Commingle Zones <input type="checkbox"/> Intent to Recomplete (Submit Form 2) <input type="checkbox"/> Change Drilling Plans <input type="checkbox"/> Reservoir Stimulation <input type="checkbox"/> Perforating/Perfs Added Gross Interval Changed? <input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Request to Vent or Flare <input type="checkbox"/> Repair Well <input type="checkbox"/> Convert Well to Injection (in an Approved Secondary Project) <input type="checkbox"/> Additional Source Leases for Water Disposal Well <input checked="" type="checkbox"/> Other: Closed production pit.	<input type="checkbox"/> E&P Waste Disposal <input type="checkbox"/> Beneficial Reuse of E&P Waste <input type="checkbox"/> New Pit <input type="checkbox"/> Landfarming <input type="checkbox"/> Status Update/Change of Remediation Plans for Spills and Releases
---	--	---

I hereby certify that the statements made in this form are, to the best of my knowledge, true, correct, and complete.

Print Name James W. Rowland

Signed James W. Rowland Title: Engineer Date: Jan. 28, 1998

OGCC Approved: _____ Title: _____ Date: _____

CONDITIONS OF APPROVAL, IF ANY:

FORM
4
Rev 2003

TECHNICAL INFORMATION PAGE

Page 2

1. Operator Number: 59100	2. API Number: 05- 075087120
3. Name of Operator: Rex Monahan	
4. Well Name: Duncan	Number: 1 (Associated pit.)
5. Location (Cnty, Sec, Twp, Rng, Meridian): NE NW Sec. 21-T8N-R54W	

FOR COGCC USE ONLY

ET	OE	PR	ES

This form is to be completed whenever a Sundry Notice is submitted requiring detailed report of work to be performed or completed. This form shall be transmitted within thirty (30) days of work completed as a "subsequent" report and must accompany Form 4, page 1.

6. DESCRIBE PROPOSED OR COMPLETED OPERATIONS

This earthen production pit associated with the Duncan #1 well was closed in September, 1997 in compliance with the COGCC Series 1000 Rules.

This pit was originally constructed in 1980. A copy of the original permit is attached.

No ESP waste was present in the pit at the time of its closing. No other debris or trash was in the pit at its closing. The water discharge line was removed prior to its closing. The soil removed during the construction of the pit was used to fill it. The pit surface was restored to its natural contour.

STATE OF COLORADO
OIL AND GAS CONSERVATION COMMISSION
Department of Natural Resources

RECEIVED
JAN 12 1980

APPLICATION FOR PERMIT TO USE EARTHEN PIT			
1. CHECK ONE: NEW PIT <input checked="" type="checkbox"/> EXISTING PIT <input type="checkbox"/> TREATMENT FACILITY <input type="checkbox"/> OTHER <input type="checkbox"/>			
2. NAME OF OPERATOR <u>Rex Menahan</u>			
3. ADDRESS OF OPERATOR <u>Box 1231 Sterling, Colo. 80751</u>			PHONE NO. <u>522-0774</u>
4. LEASE NAME <u>Duncan</u>	5. PRODUCING FORMATION <u>Nakata</u>	6. GROUND ELEVATION <u>4336</u>	
7. LOCATION (Report location clearly to the nearest 10 acres) <u>Ne NW Sec-27-8N-54W</u>		B. COUNTY <u>Jefferson</u>	9. STATE <u>Colo</u>
10. SIZE OF PIT: LENGTH <u>120</u> FT. WIDTH <u>720</u> FT. DEPTH <u>15</u> FT.			
11. CAPACITY <u>30,000</u> BBLs.		12. ESTIMATED INFLOW <u>20</u> BIS/DAY	
13. DISPOSAL OF PIT CONTENT: HAULED _____ DISPOSAL WELL _____ EVAPORATION <input checked="" type="checkbox"/>			
14. MAXIMUM FLUID LEVEL ABOVE AVG. GROUND LEVEL <u>7.000</u> FT.			
15. DRAINAGE DISTANCE IN FEET TO CLOSEST FRESH WATER POND, STREAM OR LAKE <u>3 miles</u> FT.			
16. SUBSOIL TYPE <u>Sandy loam</u>			
17. TYPE OF SEALING MATERIAL (Including specifications and Method of Application) <u>Asphal</u>			
18. ADDITIONAL INFORMATION (By attachment include detailed plan of operation, chemical analysis of produced water, necessary maps, logs and other information as may be required by Rules 325 and 328 of the Rules and Regulations of the Oil and Gas Conservation Commission.)			
19. I HEREBY CERTIFY THAT THE FOREGOING IS TRUE AND CORRECT			
SIGNED <u>[Signature]</u>		TITLE <u>Operator</u>	DATE <u>6-12-80</u>
THIS SPACE FOR COMMISSION USE			
APPROVED BY <u>[Signature]</u>		TITLE <u>Director</u>	DATE <u>JAN 27 1983</u>
CONDITIONS OF APPROVAL, IF ANY: <p style="text-align: center; font-weight: bold;">SEE ATTACHED MEMO</p>			

COLORADO OIL AND GAS CONSERVATION COMMISSION
Room 721, State Centennial Building
1313 Sherman Street
Denver, Colorado 80203

MEMO

TO: D. V. Rogers

January 26, 1983

FROM: R. C. Campbell

SUBJECT: Evaluation of Retaining Pits

On January 25, 1983, an evaluation was made of the retaining pits in the Pawnee Creek North Field, Logan County.

Rex Monahan
Duncan Lease, NENW 27-8N-54W

This well produces oil from the Dakota formation and the "J" sand. The pit is 120'x120'x15', with an estimated inflow of 20 barrels per day of produced water. The water analysis indicates a TDS of 4237 ppm.

The area is covered by Eolian deposits, underlain by the upper unit of the Pierre Shale.

There are a few water wells in the area and the nearest stream or drainage is one mile distant.

The uncovered pit should be kept free of oil accumulation.



PIT INSPECTION FORM

DATE 9/9/86 OPERATOR J. Marchan FIELD Logan
COUNTY Logan LEASE Dunson #1 LOCATION NENW 27-8N-54W
CLASS 3.0 LEASE SIGN: YES NO TANK ID: YES NO
(2) 300661

TYPE OF OBSERVED WATER DISPOSAL:
EVAP. PITS TANKS/TRUCKED INJECTED* NOT DETERMINED NA
ESTIMATED WATER PRODUCTION GPM * (34.3) = BPD

SKIM TANK: SIZE 100 GALS, METAL FIBERGLASS PLASTIC CEMENT
COVERED YES NO, OVERFLOW YES NO

Table with columns for SKIM PIT(S) and EVAPORATIVE PIT(S). Rows include SIZE, MATERIAL (wood), SCREEN, SCREEN COLLAPSED, FLAGS, OIL COVERED, LINER MATERIAL, and BREACHED.

COMMENTS S-Sand well. P-picks operating
(Pit has inflow)

PIT PERMIT YES NO, LINER REQUIRED YES NO, TDS ppm
REPORTED WATER PRODUCTION 20 BBL/DAY LEASE NUMBER 31001
* INJECTION FACILITY: NAME LOCATION

NOTICE SENT YES NO DATE SENT INSPECTOR SP

Appendix F



COGIS - WELL Information

113128

* Need pit facility assigned 119979

Scout Card

- Related
- Insp.
- MIT
- GIS
- Doc
- Wellbore
- Orders

Surface Location Data for API # 05-075-09209

Status: PA

Well Name/No: SEGELKE #1 (click well name for production)
 Operator: PRIVATE OIL INDUSTRIES INC - 72120
 Status Date: 1/22/2002 Federal or State Lease #:
 County: LOGAN #075 Location: NWSW 28 11N 53W 6 PM
 Field: BONANZA-NORTH - #7167 Footlages: 1920 FSL 600 FWL
 DRLG Contr #: GEAR DRILLING COMPANY Elevation: 4,509 ft.
 Lat: 40.896471 Long: -103.264297

Wellbore Data for Sidetrack #00 Status: PA 1/22/2002
 Spud Date: 12/17/1990 Spud Date Is: ACTUAL

Wellbore Permit

Permit #: 19891066 Expiration Date: 3/24/1990
 Prop Depth/Form: 5400 Surface Mineral Owner Same: Y
 Mineral Owner: FEE Surface Owner: FEE
 Unit: Unit Number:

Formation and Spacing: Code: JSND , Formation: J SAND , Order: 0 , Unit Acreage: 40, Drill Unit: NWSW

Wellbore Completed

Complt Date: 2/22/1990
 Measured TD: 5395 Measured PB depth: 0
 True Vertical TD: True Vertical PB depth:

Log Types: DUAL INDUCTION/SFL FD/GR
 Casing: String Type: SURF , Hole Size: 12.25, Size: 8.625, Top: 0, Depth: 261, Weight: 24
 Cement: Sacks: 160, Top: 0, Bottom: , Method Grade:
 Casing: String Type: 1ST , Hole Size: 8.625, Size: 5.5, Top: 0, Depth: 5392, Weight: 15.5
 Cement: Sacks: 150, Top: 4344, Bottom: , Method Grade: CBL

Formation	Log Top	Log Bottom	Cored	DSTs
NIOBRARA	4342			
CARLILE	4701			
GREENHORN	4906			
BENTONITE	5048			
D SAND	5144			
J SAND	5264			Y

Completed information for formation JSND

1st Prod Date: 3/15/1990 Choke Size:
 Status Date: 1/22/2002 Hole Compl:
 Commingled: Prod Metod: PUMPING
 Formation Name: J SAND Status: PA
 Formation Treatment: 7500 LBS 20/40 SAND IN 12,500 GALS 40# GELLED WATER
 Tubing Size: 2.875 Tubing Setting Depth: 5317
 Tubing Packer Depth: Tubing Multiple Packer:
 Open Hole Top: Open Hole Bottom:
 Initial Test Data:
 Test Date: 3/21/1990 Test Method: PUMPING
 Gas Dispo: VENTED

Test Type	Measure
BBLS_H2O	8
BBLS_OIL	22
CALC_GOR	818
CASING_PRESS	20
GRAVITY_OIL	39.5
MCF_GAS	18

Perforation Data:
 Interval Bot: 5281 Interval Top: 5277
 # of Holes: 16 Hole Size:

COGIS - WELL Information

Scout Card

Related
 Insp.
 MIT
 GIS
 Doc
 Wellbore
 Orders

Surface Location Data for API # 05-075-09050

Status: PA

Well Name/No: **M SEGELKE #1** (click well name for production)
 Operator: CENTENNIAL PETROLEUM INC - 14851
 Status Date: 12/4/1990 Federal or State Lease #:
 County: LOGAN #075 Location: NENE 26 11N 53W 6 PM
 Field: ARMSTRONG - #3000 Footages: 330 FNL 1300 FEL
 DRLG Contr #: ORBIT DRILLING INC Elevation: 4,802 ft.
 Lat: 40.904783 Long: -103.252018

Wellbore Data for Sidetrack #00

Status: PA 12/4/1990

Spud Date: 5/29/1984 Spud Date is: ACTUAL

Wellbore Permit

Permit #: 19840620 Expiration Date: 9/20/1984
 Prop Depth/Form: 8150 Surface Mineral Owner Same:
 Mineral Owner: FEE Surface Owner:
 Unit: Unit Number:

Formation and Spacing: Code: DSMS , Formation: DES MOINES , Order: 0 , Unit Acreage: 40. Drill Unit: NENE

Wellbore Completed

Compltn Date: 8/1/1984
 Measured TD: 8055 Measured PB depth: 5700
 True Vertical TD: 0 True Vertical PB depth:

Log Types: COMP DEN NEU, CBL/GR, CYBERLOOK, PROPAGATION, GR SPECTROMETRY, IND, LITHO-DEN, BOREHOLE COMP SONIC

Casing: String Type: SURF , Hole Size: 10.75, Size: 8.825, Top: 0, Depth: 312, Weight: 36

Cement: Sacks: 310, Top: 0, Bottom: , Method Grade:

Casing: String Type: 1ST , Hole Size: 7.875, Size: 5.5, Top: 0, Depth: 5819, Weight: 15.5, 14

Cement: Sacks: 420, Top: 0, Bottom: , Method Grade:

Formation	Log Top	Log Bottom	Cored	DSTs
NIOBRARA	4428			
CARLILE	4783			
CODELL	4824			
GREENHORN	5008			
BENTONITE	5141			
D SAND	5234			
J SAND	5355			
O SAND	5607			
MORRISON	5780			
PERMIAN	6224			
BLAINE	6446			
LYONS	6540			
WOLFCAMP	6634			Y
VIRGIL	7081			
MISSOURI	7310			
DES MOINES	7443			Y
ATOKA	7665			
MORROW	7865			
GRANITE	7975			
PRECAMBRIAN	8054			

Completed information for formation OSND

1st Prod Date: 9/13/1984 Choke Size:
 Status Date: 12/4/1990 Hole Compl:
 Commingled: Prod Method: PUMPING
 Formation Name: O SAND Status: PA
 Formation Treatment: 4000 GALS DIESEL, 25 GALS HYFLO, 85 RN BALL SEALERS, 4620 GALS 2% KCL
 Tubing Size: 2.875 Tubing Setting Depth: 5695

COGIS - WELL Information

PIT - 113128

Scout Card

Surface Location Data for API # 05-075-07003

Status: PA

Well Name/No: SEGELKE #1 (click well name for production)
 Operator: WALSH* FRANK H - 94100
 Status Date: 6/8/1971 Federal or State Lease #:
 County: LOGAN #075 Location: NWNE 26 11N 53W 6 PM
 Field: WILDCAT - #99999 Footages: 330 FNL 1650 FEL
 DRLG Contr #: Elevation: 4,807 ft.
 Lat: 40.904778 Long: -103.253284

Wellbore Data for Sidetrack #00

Status: PA 6/8/1971

Spud Date: 3/8/1950 Spud Date is: ACTUAL

Wellbore Permit

Permit #: 19500000 Expiration Date: 7/14/1950
 Prop Depth/Form: 5750 Surface Mineral Owner Same:
 Mineral Owner: FEE Surface Owner:
 Unit: Unit Number:

Formation and Spacing: Code: DKTA , Formation: DAKOTA , Order: , Unit Acreage: , Drill Unit:
 Formation and Spacing: Code: LKTA , Formation: LAKOTA , Order: , Unit Acreage: , Drill Unit:
 Formation and Spacing: Code: MDDY , Formation: MUDDY , Order: 0 , Unit Acreage: 0, Drill Unit:

Wellbore Completed

Complt Date: 5/14/1950
 Measured TD: 5800 Measured PB depth: 5709
 True Vertical TD: 0 True Vertical PB depth:
 Casing: String Type: SURF , Hole Size: , Size: 10.75, Top: 0, Depth: 600, Weight: 40.5
 Cement: Sacks: 400, Top: 0, Bottom: , Method Grade:
 Casing: String Type: 1ST , Hole Size: , Size: 7, Top: 0, Depth: 5775, Weight: 23
 Cement: Sacks: 400, Top: 4050, Bottom: , Method Grade:

Formation	Log Top	Log Bottom	Cored	DSTs
NIOBRARA	4464			
FORT HAYS	4720			
CARLILE	4798			
GREENHORN	4980			
GRANEROS	5028			
O SAND	5238			
J SAND	5356		Y	Y
O SAND	5608		Y	Y
MORRISON	5780			

Completed information for formation DSND

1st Prod Date: N/A Choke Size:
 Status Date: 6/8/1971 Hole Compl:
 Commingled: N Prod Method:
 Formation Name: D SAND Status: PA

Formation Treatment:
 Tubing Size: Tubing Setting Depth:
 Tubing Packer Depth: Tubing Multiple Packer:
 Open Hole Top: Open Hole Bottom:

No Initial Test Data was found for formation DSND .

Perforation Data:
 Interval Bot: 5259 Interval Top: 5251
 # of Holes: Hole Size:

Completed information for formation J-O

1st Prod Date: 6/2/1950 Choke Size:
 Status Date: 4/22/1988 Hole Compl:
 Commingled: Y Prod Method:
 Formation Name: J & O SAND Status: AB

113128

COGIS - Facility Query Results



You requested facilities by:	'PIT'
Maximum records are limited to:	10
For detail information:	Click on facility type.

Search Results - 4 record(s) returned.

Facility Type	Facility ID/ API	Facility Name/ Number	Operator Name/ Number	Status	Field Name/ Number	
<u>PIT</u>	113128	SEGELKE 1	WALSH* FRANK H 94100			LOC NWNE
<u>PIT</u>	119979	SEGELKE 1	PRIVATE OIL INDUSTRIES INC 72120			LOC NWSW
<u>PIT</u>	256304	PROPST 1-A	WESTERN OPERATING COMPANY 95620	AC		LOC SWSW
<u>PIT</u>	100310	PROPST 1A	WESTERN OPERATING COMPANY 95620			LOC SWSW

113128

99999999

PIT INSPECTION FORM

DATE 10/21/86 OPERATOR Pertman FIELD Armstrong
COUNTY Logan LEASE Segelke LOCATION NENE 26-11N-53W

CLASS 3-b LEASE SIGN: YES NO TANK ID: YES NO

TYPE OF OBSERVED WATER DISPOSAL: (2) 300 Barrels
 EVAP. PITS TANKS/TRUCKED INJECTED* NOT-DETERMINED NA
ESTIMATED WATER PRODUCTION _____ GPM * (34.3) = _____ BPD

SKIM TANK: SIZE none GALS, METAL FIBERGLASS PLASTIC CEMENT
COVERED YES NO, OVERFLOW YES NO

PITS:	SKIM PIT(S)	EVAPORATIVE PIT(S)
SIZE:	<u>10 * 10</u> = _____ SOFT	<u>30 * 40</u> = _____ SOFT
MATERIAL	<u>Native soil</u>	<u>40 * 40</u> = _____ SOFT
SCREEN:	<u>YES</u> <input checked="" type="checkbox"/> <u>NO</u>	<u>*</u> = _____ SOFT
SCREEN COLLAPSED	<u>YES</u> <input type="checkbox"/> <u>NO</u>	TOTAL = _____ SOFT
FLAGS	<u>YES</u> <input type="checkbox"/> <u>NO</u>	LINER MATERIAL: <u>COMM. BENT.</u> _____
OIL COVERED	<u>100</u> %	<u>SYNTHETIC</u> _____
		<u>NATIVE SOIL</u> _____
		<u>NONE</u> _____
		OIL COVERED _____ %
		BREACHED <u>YES</u> <input type="checkbox"/> <u>NO</u> <input type="checkbox"/>

0-Sand

COMMENTS P. gack on well, producing, pits full + have inflow.
(William Perlman written on tank)
* Left T.D. notice + pit screen needed
send letter also * need wtr production

PIT PERMIT YES NO , LINER REQUIRED YES NO , TDS _____ ppm
REPORTED WATER PRODUCTION 0 BBL/DAY LEASE NUMBER 2701
* INJECTION FACILITY: NAME _____ LOCATION _____

NOTICE SENT YES NO DATE SENT _____ INSPECTOR S. Pott



113128

9/29/84 - Only find SUN location on plat - can't find file.

Really looks like replacement of #1
about 50' between wellheads.

2 - 2 Walsh files of Segelke
No Kimbark

20

113128



LEASE INSPECTION FORM

Date Sept 18 1984
 Operator Kimbark Field Armstrong
 Lease Name & No. Segelke (X?) County Logan
 Tank Battery No. _____ Location 11 53 W 18 26
 Legal Description NWSE
 Type of Inspection Req Pit
 Water Inflow _____ (Bbls. per Day)

RESULTS OF INSPECTION

(Est. Pit Dimensions, CVD, Lined, Oil on Surface, etc.)
Type of Tank

SKIM TANK _____

PIT NO. 1 Skim - 10X10

PIT NO. 2 30X50 - Clear

PIT NO. 3 50X50 - Clear

ADDITIONAL PITS _____

Did they re-enter?

CONDITION OF LEASE (Describe - Oil CVD. or Sat. Gr., Any Leaking, Safety Conditions, Etc.)

Venting lot of gas in skirt | Look up
looks like replacement well | on plat

RECOMMENDED ACTION (If Required) _____

INSPECTOR D. Brink

COGIS - Facility Query Results



You requested facilities by:	'WELL', 'PIT'
Maximum records are limited to:	100
For detail information:	Click on facility type.

Search Results - 15 record(s) returned.

Facility Type	Facility ID/ API	Facility Name/ Number	Operator Name/ Number	Status	Field Name/ Number	Location
WELL	05-075-08349	SEGELKE 1	KIMBARK OIL & GAS COMPANY 47700	PA	ARMSTRONG 3000	LOGAN 075/3E NENE 26 11N 53
WELL	05-075-09060	M SEGELKE 1	CENTENNIAL PETROLEUM INC 14851	PA	ARMSTRONG 3000	LOGAN 075/3E NENE 26 11N 53
PIT	113128	SEGELKE 1	PRIVATE OIL INDUSTRIES INC 72120 WALSH			LOGAN 075/3E NENE 26 11N 53
WELL	05-075-07003	SEGELKE 1	WALSH* FRANK H 94100	PA	WILDCAT 99999	LOGAN 075/3E NWNE 26 11N 53
WELL	05-075-09325	SEGELKE 1	SMITH OIL PROPERTIES INC 79905	DA	WILDCAT 99999	LOGAN 075/3E NWNW 26 11N 53
WELL	05-075-06976	H J SEGELKE 2	BRITISH-AMERICAN OIL PROD CO 10558	PA	ARMSTRONG 3000	LOGAN 075/3E NWSE 26 11N 53
WELL	05-075-09209	SEGELKE 1	PRIVATE OIL INDUSTRIES INC 72120	PA	BONANZA-NORTH 7167	LOGAN 075/3E NWSW 26 11N 53
WELL	05-075-09284	SEGELKE 1-A	SCHNEIDER ENERGY SERVICES INC 76840	DA	BONANZA-NORTH 7167	LOGAN 075/3E NWSW 26 11N 53
WELL	05-075-06986	SEGELKE 4	BRITISH-AMERICAN OIL PROD CO 10558	DA	ARMSTRONG 3000	LOGAN 075/3E SENE 26 11N 53
WELL	05-075-06962	PROBST 1	RAYMOND OIL COMPANY INC 73613	DA	ARMSTRONG 3000	LOGAN 075/3E SESE 26 11N 53
WELL	05-075-09066	PROBST 1	MILLER-CHRISTENSEN OIL CORP 57525	DA	WILDCAT 99999	LOGAN 075/3E SESW 26 11N 53
WELL	05-075-08193	SEGELKE 1	OKMAR OIL CO 65850	AL	ARMSTRONG 3000	LOGAN 075/3E SWNE 26 11N 53
PIT	256304	PROPST 1-A	WESTERN OPERATING COMPANY 95620	AC		LOGAN 075/3E SWSW 26 11N 53
WELL	05-075-09204	PROPST 1	WESTERN OPERATING COMPANY 95620	PR	BONANZA-NORTH 7167	LOGAN 075/3E SWSW 26 11N 53
PIT	100310	PROPST 1A	WESTERN OPERATING COMPANY 95620			LOGAN 075/3E SWSW 26 11N 53

Handwritten arrow pointing from the left margin to the 'PIT' entries in the table.

119979

113128 - change to
New Pit in NWSW, Private D/WG

113128

RCL



19

LEASE INSPECTION FORM

Operator ~~Kimbark~~ Private Oil Date May 2 1984
 Lease Name & No. Segelke 1X Field Armstrong
 Tank Battery No. 11 N. 53 A 26 County Logan
 Location Legal Description
 Type of Inspection Reg Pit
 Water Inflow _____ (Bbls. Per Day)

RESULTS OF INSPECTION

(Est. Pit Dimensions, CVD, Lined, Oil on Surface, etc.)
Type of Tank

SKIM TANK _____

Pit No. 1 _____

Pit No. 2 50x50 - Clear - 3' Free

Pit No. 3 _____

ADDITIONAL PITS _____

CONDITION OF LEASE (Describe - Oil CVD. or Sat. Gr., Any Leaking, Safety Conditions, Etc.) -

Good

RECOMMENDED ACTION (If Required) _____

INSPECTOR D. Bucknell

113128



COGIS - WELL Information

113128

* Need pit facility assigned 119979

Scout Card

-

Surface Location Data for API # 05-075-09209

Status: PA

Well Name/No: SEGEIKE #1 (click well name for production)
 Operator: PRIVATE OIL INDUSTRIES INC - 72120
 Status Date: 1/22/2002 Federal or State Lease #:
 County: LOGAN #075 Location: NWSW 26 11N 53W 6 PM
 Field: BONANZA-NORTH - #7167 Footages: 1920 FSL 600 FWL
 DRLG Contr #: GEAR DRILLING COMPANY Elevation: 4,509 ft.
 Lat: 40.896471 Long: -103.264297

Wellbore Data for Sidetrack #00

Status: PA 1/22/2002

Spud Date: 12/17/1990 Spud Date is: ACTUAL

Wellbore Permit

Permit #: 19891066 Expiration Date: 3/24/1990
 Prop Depth/Form: 5400 Surface Mineral Owner Same: Y
 Mineral Owner: FEE Surface Owner: FEE
 Unit: Unit Number:

Formation and Spacing: Code: JSND , Formation: J SAND , Order: 0 , Unit Acreage: 40 , Drill Unit: NWSW

Wellbore Completed

Comptn Date: 2/22/1990
 Measured TD: 5395 Measured PB depth: 0
 True Vertical TD: True Vertical PB depth:

Log Types: DUAL INDUCTION/SFL FD/GR
 Casing: String Type: SURF , Hole Size: 12.25, Size: 8.625, Top: 0, Depth: 261, Weight: 24
 Cement: Sacks: 160, Top: 0, Bottom: , Method Grade:
 Casing: String Type: 1ST , Hole Size: 8.625, Size: 5.5, Top: 0, Depth: 5392, Weight: 15.5
 Cement: Sacks: 150, Top: 4344, Bottom: , Method Grade: CBL

Formation	Log Top	Log Bottom	Cored	DSTs
NIOBRARA	4342			
CARLILE	4701			
GREENHORN	4906			
BENTONITE	5048			
D SAND	5144			
J SAND	5264			Y

Completed information for formation JSND

1st Prod Date: 3/15/1990 Choke Size:
 Status Date: 1/22/2002 Hole Comp:
 Commingled: Prod Metod: PUMPING
 Formation Name: J SAND Status: PA
 Formation Treatment: 7500 LBS 20/40 SAND IN 12,500 GALS 40# GELLED WATER
 Tubing Size: 2.875 Tubing Setting Depth: 5317
 Tubing Packer Depth: Tubing Multiple Packer:
 Open Hole Top: Open Hole Bottom:
 Initial Test Data:
 Test Date: 3/21/1990 Test Method: PUMPING
 Gas Dispo: VENTED

Test Type	Measure
BELS_H2O	6
BELS_OIL	22
CALC_GOR	818
CASING_PRESS	20
GRAVITY_OIL	39.5
MCF_GAS	18

Perforation Data:
 Interval Bot: 5281 Interval Top: 5277
 # of Holes: 16 Hole Size:

COGIS - WELL Information

Scout Card

Related
 Insp.
 MIT
 GIS
 Doc
 Wellbore
 Orders

Surface Location Data for API # 05-075-09050

Status: PA

Well Name/No: M SEGELKE #1 (click well name for production)
 Operator: CENTENNIAL PETROLEUM INC - 14851
 Status Date: 12/4/1990 Federal or State Lease #:
 County: LOGAN #075 Location: NENE 28 11N 53W 6 PM
 Field: ARMSTRONG - #3000 Footages: 330 FNL 1300 FEL
 DRLG Contr #: ORBIT DRILLING INC Elevation: 4,602 ft.
 Lat: 40.904783 Long: -103.252018

Wellbore Data for Sidetrack #00

Status: PA 12/4/1990

Spud Date: 5/29/1984 Spud Date is: ACTUAL

Wellbore Permit

Permit #: 19840620 Expiration Date: 9/20/1984
 Prop Depth/Form: 8150 Surface Mineral Owner Same:
 Mineral Owner: FEE Surface Owner:
 Unit: Unit Number:

Formation and Spacing: Code: DSMS , Formation: DES MOINES , Order: 0 , Unit Acreage: 40, Drill Unit: NENE

Wellbore Completed

Complet Date: 8/1/1984
 Measured TD: 8055 Measured PB depth: 5700
 True Vertical TD: 0 True Vertical PB depth:

Log Types: COMP DEN NEU, CBU/GR, CYBERLOOK, PROPAGATION, GR SPECTROMETRY, IND, LITHO-DEN, BOREHOLE COMP SONIC

Casing: String Type: SURF , Hole Size: 10.75, Size: 9.625, Top: 0, Depth: 312, Weight: 36

Cement: Sacks: 310, Top: 0, Bottom: , Method Grade:

Casing: String Type: 1ST , Hole Size: 7.875, Size: 5.5, Top: 0, Depth: 5818, Weight: 15.5,14

Cement: Sacks: 420, Top: 0, Bottom: , Method Grade:

Formation	Log Top	Log Bottom	Cored	DSTs
NIOBRARA	4428			
CARLILE	4783			
CODELL	4824			
GREENHORN	5006			
BENTONITE	5141			
D SAND	5234			
J SAND	5355			
O SAND	5807			
MORRISON	5780			
PERMIAN	6224			
BLAINE	6446			
LYONS	6540			
WOLFCAMP	6634			Y
VIRGIL	7081			
MISSOURI	7310			
DES MOINES	7443			Y
ATOKA	7665			
MORROW	7865			
GRANITE	7975			
PRECAMBRIAN	8054			

Completed Information for formation OSND

1st Prod Date: 9/13/1984 Choke Size:
 Status Date: 12/4/1990 Hole Compl:
 Commingled: Prod Method: PUMPING
 Formation Name: O SAND Status: PA
 Formation Treatment: 4000 GALS DIESEL, 25 GALS HYFLO, 65 RN BALL SEALERS, 4620 GALS 2% KCL
 Tubing Size: 2.875 Tubing Setting Depth: 5695

COGIS - WELL Information

PIT - 113128

Scout Card

Surface Location Data for API # 05-075-07003

Status: PA

Well Name/No: SEGELKE #1 (click well name for production)
 Operator: WALSH* FRANK H - 94100
 Status Date: 6/8/1971 Federal or State Lease #:
 County: LOGAN #075 Location: NWNE 26 11N 53W 8 PM
 Field: WILDCAT - #98999 Footages: 330 FNL 1850 FEL
 DRLG Contr #: Elevation: 4,607 ft.
 Lat: 40.904776 Long: -103.253284

Wellbore Data for Sidetrack #00

Status: PA 6/8/1971

Spud Date: 3/6/1950 Spud Data is: ACTUAL

Wellbore Permit

Permit #: 19500000 Expiration Date: 7/14/1950
 Prop Depth/Form: 5750 Surface Mineral Owner Same:
 Mineral Owner: FEE Surface Owner:
 Unit: Unit Number:

Formation and Spacing: Code: DKTA , Formation: DAKOTA , Order: , Unit Acreage: , Drill Unit
 Formation and Spacing: Code: LKTA , Formation: LAKOTA , Order: , Unit Acreage: , Drill Unit
 Formation and Spacing: Code: MDDY , Formation: MUDDY , Order: 0 , Unit Acreage: 0, Drill Unit:

Wellbore Completed

Compltn Date: 5/14/1950
 Measured TD: 5800 Measured PB depth: 5709
 True Vertical TD: 0 True Vertical PB depth:
 Casing: String Type: SURF , Hole Size: , Size: 10.75, Top: 0, Depth: 600, Weight: 40.5
 Cement: Sacks: 400, Top: 0, Bottom: , Method Grade:
 Casing: String Type: 1ST , Hole Size: , Size: 7, Top: 0, Depth: 5775, Weight: 23
 Cement: Sacks: 400, Top: 4050, Bottom: , Method Grade:

Formation	Log Top	Log Bottom	Cored	DSTs
NIOBRARA	4464			
FORT HAYS	4720			
CARLILE	4786			
GREENHORN	4980			
GRANEROS	5028			
D SAND	5238			
J SAND	5356		Y	Y
O SAND	5808		Y	Y
MORRISON	5780			

Completed information for formation DSND

1st Prod Date: N/A Choke Size:
 Status Date: 6/8/1971 Hole Compl:
 Commingled: N Prod Method:
 Formation Name: D SAND Status: PA
 Formation Treatment:
 Tubing Size: Tubing Setting Depth:
 Tubing Packer Depth: Tubing Multiple Packer:
 Open Hole Top: Open Hole Bottom:

No Initial Test Data was found for formation DSND .

Perferation Data:
 Interval Bot: 5259 Interval Top: 5251
 # of Holes: Hole Size:

Completed information for formation J-O

1st Prod Date: 6/2/1950 Choke Size:
 Status Date: 4/22/1988 Hole Compl:
 Commingled: Y Prod Method:
 Formation Name: J & O SAND Status: AB

Appendix G



LORADO
ATION COMMISSION
iral Resources

RECEIVED

Oct 11 1971

99999999

APPLICATION FOR PERMIT TO USE EARTHEN PIT
COLO. OIL & GAS CONS. COMM

1. CHECK ONE: NEW PIT EXISTING PIT TREATMENT FACILITY OTHER

2. NAME OF OPERATOR
~~Atlantic Richfield Company~~ Hondo Padroni-West

3. ADDRESS OF OPERATOR 1860 Lincoln St., Suite 501, Denver, Colorado, 80203
PHONE NO. 303/266-2460

4. LEASE NAME W. E. Dickinson
5. PRODUCING FORMATION "O" Sand
6. GROUND ELEVATION 4065

7. LOCATION (Report location clearly to the nearest 10 acres) NE SE SW Section 7-T9N-R52W
8. COUNTY Logan
9. STATE Colorado

10. SIZE OF PIT:
LENGTH 200 FT. WIDTH 200 FT. DEPTH 6 FT.

11. CAPACITY 44,000 BBLs.
12. ESTIMATED INFLOW Used for emergency only BIS/DAY

13. DISPOSAL OF PIT CONTENT:
HAULED _____ DISPOSAL WELL X EVAPORATION _____

14. MAXIMUM FLUID LEVEL ABOVE AVG. GROUND LEVEL 3 FT.

15. DRAINAGE DISTANCE IN FEET TO CLOSEST FRESH WATER POND, STREAM OR LAKE
To irrigation canal - 1,000 FT.

16. SUBSOIL TYPE
Pierre Shale

17. TYPE OF SEALING MATERIAL (Including specifications and Method of Application)
None

18. ADDITIONAL INFORMATION (By attachment include detailed plan of operation, chemical analysis of produced water, necessary maps, logs and other information as may be required by Rules 325 and 326 of the Rules and Regulations of the Oil and Gas Conservation Commission.)

See Attachments

DVR	
FJP	
HHM	<input checked="" type="checkbox"/>
JAM	<input checked="" type="checkbox"/>
JJD	

19. I HEREBY CERTIFY THAT THE FOREGOING IS TRUE AND CORRECT
SIGNED [Signature] TITLE Dist. Prod. & Drlg. Supt DATE 10-8-71

THIS SPACE FOR COMMISSION USE

APPROVED BY [Signature] TITLE DIRECTOR DATE NOV 19 1971

CONDITIONS OF APPROVAL, IF ANY:



116260

DETAILED PLAN OF OPERATION

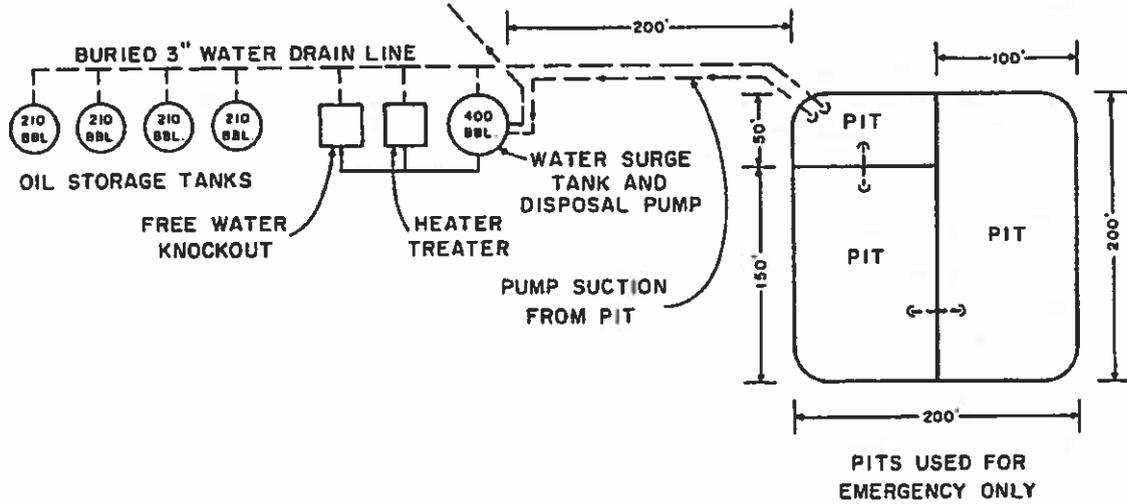
The W. E. Dickinson Lease is located in the West Padroni Field in Logan County, Colorado. Atlantic Richfield is the Operator. There are three (3) producing oil wells on the lease, and one (1) water disposal well. Total lease production is 95 BOPD and 1302 BWP. Treating facilities consist of four 210-barrel oil storage tanks, a freewater knockout, a heater treater, and a 400-barrel water surge tank. The effluent from the freewater knockout and heater treater is piped to the water surge tank where it is pumped to a water disposal well. The water disposal well is No. W-4 located in the NW SW of Section 6, Township 9 North, Range 52 West, Logan County, Colorado.

All produced water is injected into the "J" Sand from 4790' to 4820' and the retaining pit is used for emergency only, such as the injection pump being down for repairs or repairs to treating facilities. Any effluent to the retaining pit as the result of such downtime is pumped back to the water surge tank for injection into the disposal well.

On January 2, 1968, an application was made by the Sinclair Oil and Gas Company to the Colorado Oil and Gas Commission to inject produced water into the W. E. Dickinson No. 4. A letter of authorization to inject produced water into the W. E. Dickinson No. 4 was received by Sinclair Oil and Gas Company from the Colorado Oil and Gas Commission on January 19, 1968. Atlantic Richfield Company is successor to Sinclair Oil and Gas Company.

A.R.Co.
W. E. Dickinson
DISPOSAL WELL

W-4



Atlantic Richfield Company
DICKINSON LEASE
WEST PADRONI FIELD
LOGAN COUNTY, COLORADO

The three pits referred to, that Atlantic Richfield has in the West Padroni field, are located approximately as follows: SW NW, NE Sec. 6-9N-52W, NE SE SW Sec. 7-9N-52W, all in Logan County, Colorado.

Based on drillers logs of the seven closest water wells and several seismic shot holes, it is estimated that the pits are located in either top soil or the Tertiary White River Group. The top soil and/or the White River Group, approximately 15' - 30' thick, overlies the Pierre shale of Upper Cretaceous Age which is a dark impermeable shale containing lenses and stringers of clay sandstone.

The shotholes referred to above were drilled to depths of 100' to 150' in the Pierre shale with no water reported. The above mentioned water wells were drilled to depths of 231' to 335' in the Pierre shale with static water levels reported from 9' to 120'. The assumption is, therefore, made that these drilling depths were necessary to obtain sufficient quantities of water and that the source of water in these wells is the Pierre. On this basis, I would then estimate that the first source of appreciable water should be approximately 75' to 100' below the base of the pits.

This was discussed at some length with Mr. Richard Pearl, Hydrologist with the Colorado Geological Survey. Mr. Pearl was in agreement with the above conclusions and that, in his opinion, the subject pits should not be a source of contamination to the ground water.

M. F. Gravender

M. F. Gravender *Ry JEU*
Area Geologist
Atlantic Richfield Co.

MFG:bb

cc: Richard Pearl

Water Wells
Drillers Logs
Logan Co., Colorado

SESE 4-9N-52W	TD 321' Static WL 63' Csg: 6 $\frac{1}{2}$ " 0-92' Drawdown 157' Date Comp. Oct. 12, 1969	0.0- 1.5 Top 1.5- 7.5 Sd cly 7.5- 13.0 Cly 13.0- 35.0 Brule (gry) 35.0- 47.0 Blue Brule 47.0- 47.5 Rock 47.5- 68.0 Blue Brule 68.0- 90.0 Sh 90.0-111.5 Sh 111.5-112.0 Rock 112.0-127.0 Sh 127.0-127.5 Rock 127.5-147.0 Sh 147.0-147.5 Rock 147.5-167.0 Sh 167.0-168.0 Rock 168.0-196.0 Sh 196.0-196.5 Rock (hd) 196.5-205.0 Sh 205.0-205.5 Rock 205.5-219.5 Sh 219.5-221.0 Rock (hd) 221.0-254.0 Sh 254.0-257.0 Rock 257.0-282.0 Sh & some sd 282.0-283.0 Rock 283.0-305.0 Sh & some sd 305.0-306.0 Rock 306.0-314.0 Sh 314.0-315.0 Rock 315.0-321.0 Sh
SWNW 4-9N-52W	Comp. May 3, 1969 Static WL 12' TD 51' Drawdown 2' Perf. 26-51	0- 3 Top 3- 8 Cly & Sd 8-12.5 Grav, cly & sd 12.5- 17 Grav & a little cly 17- 30 Grav & Boulders 30- 34 Grav & cly 34- 52 Sh blossom 52-57 Sh
NW SE 4-9N-52W	Comp. December 1960 Domestic WL 32' Perf 60-76 TD 76'	0- 10 Top 10- 45 Sd & cly 45- 76 Cly

SE SW 6-9N-52W	Comp 7-6-67 Csg: 0-84 WL 40' Drawdown to 245 TD 250'	0- 5 Top soil 5- 20 Cly 20- 25 Sd 25- 55 Ylw sh (top KP?) 55-250 Blue sh & sd stgrs
NE NE 7-9N-52W	Comp. June 1965 Depth to wtr 9' Drawdown 150' Perf: 33-45 TD 245	0- 13 Sd 13- 66 Ylw cly 66-230 Blue sh 230-245 Sd sh
SE SE 7-9N-52W	Domestic Comp April 1964 Depth to wtr 32' Drawdown 100' TD 266' Csg 0-100 No perf csg	0- 2 Top 2- 18. Sd & grav 18- 35 Ylw sh 35- 80 Blk sft top sh 80-266 Blue sh
SE SW 7-9N-52W	Domestic Comp. February 1958 WL 35' Csg (plain) 0-125 TD 215'	0- 4 Top 4- 20 Cly 20- 25 Sd 25-105 Ylw sh 105-215 Gry sh w/stks sd
NW NE 8-9N-52W	Comp. July 8, 1967 Perf 50-60 WL 10' TD 60' Drawdown 4'	0- 2 Top 2- 8 Sd & cly 8- 13 Brule & grav 13- 34 Sh blossom & thn rock 34- 61 Sh
NE NE 8-9N-52W	Comp. October 31, 1964 WL 9' TD 40' Drawdown 30' Perf csg 8-40	0- 2 Top 2- 4 Loam 4- 7 Cly 7- 9 Sd 9-11.5 Gav & sd 11.5- 24 Brule cly & rock 24- 28 Sh blossom 28- 30 Sh 30- 31 Rock 31- 40
SE SE 8-9N-52W	Comp April 1964 WL 150 TD 310' Drawdown 310' Csg 0-73	0- 3 Top 3- 8 Cly 8- 19 Sd & grav 19- 34 Ylw cly 34-310 Blue sh

SE NW 9-9N-52W	Comp. December 2, 1964 WL 10' TD 40' Drawdown 30' Perf csg 10-40'	0- 2 Top 2- 6 Loam 6- 11 Sd & crs sd 11- 14 Grav & sd 14- 26 Brule cly 26- 40 Brule & thin rock
NW NW 9-9N-52W	Domestic Comp. November 15, 1961 WL 14' Drawdown 14' TD 37' Perf csg 15-37	0- 4 Top 4- 19 Grav sd & cly 19- 28 Cly 28- 29 Grav, sd & cly 29- 37 Brule sh blossom
NW NW 10-9N-52W	Domestic Comp. March 1964 WL 57' TD 201' Drawdown 120' Csg 0-96	0- 4 Top 4- 14 Sd & muck 14- 68 Cly 68-201 Sh
NE NE 19-10N-52W	Irrigation April 1965 Trench 70' long & 33' deep (TD 33')	0- 33 Brule cly
NE NE 19-10N-52W	Comp. April 16, 1962 WL 40' Drawdown 40' TD 180 Perf csg 40-80	0- 20 Top 20- 80 Gravel 80-160 Brule cly 160-180 Ylw sh
SE NE 1-9N-53W	Comp. April 1965 WL 10' TD 231' Drawdown 150' Perf csg 197-231	0- 20 Cly 20- 41 Ylw sh 41-150 Blue sh 150-152 Sh & sd stks 152-171 Sh 171-173 Sd 173-214 Sh 214-227 Sd 227-231 Sh
NW SW 2-9N-53W	Comp. March 1958 WL 25' Drawdown 50' Perf csg 175-200 TD 200'	0-160 ?? 160-200 sh

NE NE 10-9N-53W	Comp. August 30, 1960 WL 52' Drawdown 106' Perf csg 336-360 TD 360'	0- 3 Top 3- 12 Brule cly 12- 17 SS & brule 17- 44 Sh blossoms brule 44- 47 SS 47- 61 Sft brule sh 61- 64 Rock 64- 82 Brule sh 82- 84 Rock 84-104 Bl sh & some sd 104-105 Rock 105-123 Bl sh & some sd 123-124 Rock 124-140 Bl sh & some sd 140-141 Rock 141-182 Sh 182-256 Sh & some sd 256-258 Rock 258-282 Sh & sh sd
	282-324 Sh SS 324-360 Sh SS	
SW SE 12-9N-53W	Comp. July 1964 WL 100' TD 276' Csg 0-79 Drawdown 276	0- 2 Top soil 2- 6 Cly 6- 19 Sd & grav 19- 40 Cly 40-276 Sh
NW NE 13-9N-53W	Stock well Comp. July 1960 WL 40' TD 200' Perf csg 180-200	0- 15 Fg. sd 15- 35 Cly 35-200 Sh
SE NW 15-10N-53W	Stock Comp. April 1970 WL 160' TD 390' Perf csg 370-390 Drawdown 390'	0- 2 Top 2- 10 Sdy cly 10- 95 Ylw sh 95-390 Blue sh
NE SE 25-10N-53W	Stock Comp. November 1, 1966 Perf csg 10-62' WL 10' TD 62' Drawdown 52'	0- 2.5 Top 2.5-10 Sd & cly 10- 45 Brule 45- 61 Sh
SW NE 36-10N-53W	Stock Comp. December 1964 WL 120' TD 335' Drawdown 180 Csg 0-72	0- 3 Top 3- 8 Sdy cly 8- 56 Ylw sh 56-335 Blue sh

MEMORANDUM

TO: D. V. Rogers

FROM: C. G. McDowell

On September 27, 1972, I drove to the Padroni West Field,
Logan County.

Atlantic - W. E. Dickinson lease, SE SW 7-9N-52W. One pit 50'
X 100' X 6', 100% covered oil, covered. One pit 150' X 100' X 6', 100%
covered with oil, covered. One pit 200' X 100' X 6', dry. TDS 4,910
per test "O" Sand. Some water wells in area. Nearest creek $\frac{1}{2}$ mile
west. No alluvium. White River on surface. Top of Pierre Shale
approximately 50'. Produced water is reinjected. No problem at this time.

May 2, 1974 - Field visit (GCH) 1 - large skim tank (or reinjection tank)
Pit 1 - Completely wire screen + pipe frame covered - old dead oil + some live oil
100% oil (50' x 70')
Pit 2 - Completely covered - wire screen / pipe frame, 100% oil. (50' x 70')
Pit 3 - ~20' off sq., uncovered unhurt, clean water in bottom, no oil
Pit 4 - large, filled in + graded over.

Check to see if pits are still oil covered.

9/25/74. GCH. 1 - large skim tank
Pit 1 - 20' sq. x 8', unhurt, uncovered, empty, dry, clean.
Pit 2 - 50' x 70', wire mesh + pipe frame cover, 100% tarry oil.
Pit 3 - 50' x 70', wire mesh + pipe frame cover, 100% tarry oil.

Pits are fenced; water injected.

3 REC



LEASE INSPECTION FORM

Operator Sully Date April 4, 1985
 Lease Name & No. Rickerson 1, 2 Field Padroni West
 Tank Battery No. 9N 52 CG County Logan
 Location Legal Description
 Type of Inspection peg pit
 Water Inflow _____ (Bbls. Per Day)

RESULTS OF INSPECTION
 (Est. Pit Dimensions, CVD, Lined, Oil on Surface, etc.)
 Type of Tank

SKIM TANK _____

Pit No. 1 12x20 - Wire Cover - 100% Cover - 3' Free

Pit No. 2 80x80x6 - Clear - 5' Free

Pit No. 3 _____

ADDITIONAL PITS _____

CONDITION OF LEASE (Describe - Oil CVD. or Sat. Gr., Any Leaking, Safety
 Conditions, Etc.)

Good

RECOMMENDED ACTION (If Required) _____

INSPECTOR Est. Bucknell

PIT INSPECTION FORM



DATE 7/30/86 OPERATOR ARCO FIELD Padon West
COUNTY Lynn LEASE Deekinson 1, 2, 3 LOCATION Sh 6-9N-52W
CLASS 3b LEASE SIGN: YES NO TANK ID: YES NO

TYPE OF OBSERVED WATER DISPOSAL:

EVAP. PITS TANKS/TRUCKED INJECTED* NOT DETERMINED NA
ESTIMATED WATER PRODUCTION GPM * (34.3) = BPD

SKIM TANK: SIZE GALS, METAL FIBERGLASS PLASTIC CEMENT
COVERED YES NO, OVERFLOW YES NO

PITS:		SKIM PIT(S)	EVAPORATIVE PIT(S)
SIZE:	(2)	40 * 40 =	50 * 50 =
		SOFT	SOFT
MATERIAL:		native soil	30 * 30 =
		SOFT	SOFT
SCREEN:		<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	* =
		SOFT	SOFT
SCREEN COLLAPSED		<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	TOTAL =
		SOFT	SOFT
FLAGS		<input type="checkbox"/> YES <input type="checkbox"/> NO	LINER MATERIAL:
		SOFT	COMM. BENT. <input type="checkbox"/>
OIL COVERED		100 %	SYNTHETIC <input type="checkbox"/>
		SOFT	NATIVE SOIL <input checked="" type="checkbox"/>
		SOFT	NONE <input type="checkbox"/>
		SOFT	OIL COVERED <input type="checkbox"/>
		SOFT	BREACHED <input type="checkbox"/> YES <input type="checkbox"/> NO

COMMENTS #3 - Proach, line 200
#1 - Proach, line 200
#2 - Proach, line 200

PIT PERMIT YES NO, LINER REQUIRED YES NO, TDS ppm
REPORTED WATER PRODUCTION 1000 BBL/DAY LEASE NUMBER 32452
*INJECTION FACILITY: NAME ?? LOCATION

NOTICE SENT YES NO DATE SENT INSPECTOR SP

238,000 BWP/M

RCC
①



LEASE INSPECTION FORM

Operator ARCO Date Oct 23 1984
 Lease Name & No. D. Simpson 2 Field Padroni
 Tank Battery No. 9N52N6 County Logan
 Location _____ Legal Description _____
 Type of Inspection Leg Pit
 Water Inflow _____ (Bbls. per Day) _____

RESULTS OF INSPECTION
 (Est. Pit Dimensions, CVD, Lined, Oil on Surface, etc.)
 Type of Tank

SKIM TANK _____

PIT NO. 1 - 80x40 - Wire Lower - Clean

PIT NO. 2 _____

PIT NO. 3 _____

ADDITIONAL PITS _____

CONDITION OF LEASE (Describe - Oil CVD. or Sat. Gr., Any Leaking, Safety Conditions, Etc.)
Good

RECOMMENDED ACTION (If Required) None

INSPECTOR D. Brickell

Sundt 4, 7, 3, 10
Dickinson 1, 2, 3
Parke 1 & 2,

2 RCC



LEASE INSPECTION FORM

Operator ARCO

Date April 4 1985

Lease Name & No. _____

Field Padoni West ("D")

Tank Battery No. 9N52 N6

County Logan

Type of Inspection _____

Location _____
Legal Description _____

Water Inflow _____ (Bbls. Per Day)

RESULTS OF INSPECTION

(Est. Pit Dimensions, CVD, Lined, Oil on Surface, etc.)
Type of Tank

SKIM TANK _____

Pit No. 1 30x60 - wire cover - clear - 3' Fall B

Pit No. 2 _____

Pit No. 3 _____

ADDITIONAL PITS _____

CONDITION OF LEASE (Describe - Oil CVD. or Sat. Gr., Any Leaking, Safety Conditions, Etc.)

Very good

RECOMMENDED ACTION (If Required) _____

INSPECTOR W. B. Bushnell

To View PDF's

Rules**Complete Rules (100 - 1100 Series)****List of Rules and Policies adopted betw
1990-2006****1995-1996 Major Rulemaking Overview****Purchase Rules and Regulation Boo**

<u>Cross-Reference</u>	<u>Outline of Contents</u>
<u>100 Series Rules and Regulations</u>	<u>200 Series General Rules</u>
<u>300 Series Drilling, Development, Producing and Abandonment</u>	<u>400 Series Unit Operations, Enha Recovery Projects</u>
<u>500 Series Rules of Practice and Procedure</u>	<u>600 Series Safety Regulations</u>
<u>700 Series Financial Assurance and Environmental Response Fund</u>	<u>800 Series Aesthetic and Noise Co Regulations</u>
<u>900 Series Exploration and Production Waste Management</u>	<u>1000 Series Reclamation Regulat</u>
<u>1100 Series Flowline Regulations</u>	<u>Appendix I - Information on Comp/ COGCC Forms</u>
<u>Appendix II - Sensitive Area Identification Guidance Document/Decision Tree</u>	<u>Appendix III - Fee Structure</u>
<u>Appendix IV - Due Date/Response Time</u>	<u>Appendix V - Oil & Gas Conservati Title 34-Article 60 (Amended)</u>

Appendix H



STATE OF COLORADO
OIL AND GAS CONSERVATION COMMISSION
Department of Natural Resources

99999999

APPLICATION FOR PERMIT TO USE EARTHEN PIT

1. CHECK ONE: NEW PIT EXISTING PIT TREATMENT FACILITY OTHER

2. NAME OF OPERATOR Skelly Oil Company Oxyoet Inc. Padroni W.

3. ADDRESS OF OPERATOR Suits 700, 3 Park Center, 1515 Franklin PHONE NO. 292-3660
1960 Lincoln Street, Denver, Colorado 80202

4. LEASE NAME J. W. Richerson 5. PRODUCING FORMATION 3rd Dakota "J" 6. GROUND ELEVATION 4080' GL

7. LOCATION (Report location clearly to the nearest 10 acres) SE4 NE4 NW4 Section 6-9N-52W 8. COUNTY Logan 9. STATE Colorado

10. SIZE OF PIT: 1st pit - 125' X 100' X 6' 2nd pit - 130' X 125' X 6'
LENGTH _____ FT. WIDTH _____ FT. DEPTH _____ FT.

11. CAPACITY 30,723 BBLs. 12. ESTIMATED INFLOW 308 BBL/DAY

13. DISPOSAL OF PIT CONTENT: HAULED _____ DISPOSAL WELL _____ EVAPORATION 28 B/D

14. MAXIMUM FLUID LEVEL ABOVE AVG. GROUND LEVEL 3 FT.

15. DRAINAGE DISTANCE IN FEET TO CLOSEST FRESH WATER POND, STREAM OR LAKE 3400 FT.

16. SUBSOIL TYPE 295' Oligocene White River. Shale, clay and sand group underlain by Cretaceous

17. TYPE OF SEALING MATERIAL (Including specifications and Method of Application) Pierre Shale.

None.

18. ADDITIONAL INFORMATION (By attachment include detailed plan of operation, chemical analysis of produced water, necessary maps, logs and other information as may be required by Rules 325 and 326 of the Rules and Regulations of the Oil and Gas Conservation Commission.)

Retaining pits are free of surface accumulations of oil or other liquid hydrocarbon substances.

DVR	
FJP	
HHS	<input checked="" type="checkbox"/>
JAC	<input checked="" type="checkbox"/>
JJD	

19. I HEREBY CERTIFY THAT THE FOREGOING IS TRUE AND CORRECT

SIGNED [Signature] TITLE Dist. Opr. Supt. DATE 10-29-71

THIS SPACE FOR COMMISSION USE

APPROVED BY [Signature] TITLE DIRECTOR DATE JAN 12 1973

CONDITIONS OF APPROVAL, IF ANY:
Provided that no oil or other hydrocarbon substance is allowed to accumulate on the surface of the water in the retaining pit and subject to a field inspection.



116262



DIVISION LABORATORY
Box 2400 Casper, Wyoming 82601

Date October 24, 1971

To Mr. Bud Hurley
Skelly Oil Company
Denver, Colorado

Report No. 7536

Submitted By Skelly Oil Company Date Received October 19, 1971

Well No. J. W. Ritcherson Lease NW 6-9N-52W

Location Logan County, Colorado Formation -

THIS REPORT IS THE PROPERTY OF HALLIBURTON COMPANY AND NEITHER IT NOR ANY PART THEREOF NOR A COPY THEREOF IS TO BE PUBLISHED OR USED BY ANY PERSON OR CONCERN WITHOUT FIRST SECURING THE EXPRESS WRITTEN APPROVAL OF LABORATORY MANAGEMENT.

Specific Gravity	<u>1.001</u>
pH	<u>8.1</u>
IRON (Fe)	<u>-</u>
Calcium (CA)	<u>9</u>
Magnesium (Mg)	<u>2</u>
Chlorides (Cl)	<u>1,658</u>
Sulfates (SO ⁴)	<u>109</u>
Carbonates (CO ³)	<u>Nil</u>
Bicarbonates (HCO ³)	<u>2,137</u>
Rw	<u>1.56</u>

MILLIGRAMS PER LITER

"
"
"
"
"
"

Ohms / m² / m at 73 °F

Remarks:

- Sodium, calculated 1,918 mpl
- ✓ Total dissolved solids, calculated 5,833 mpl

cc Mr. J. B. Casey
Mr. G. R. Sickendick
Mr. W. C. Maddox

Respectfully submitted,

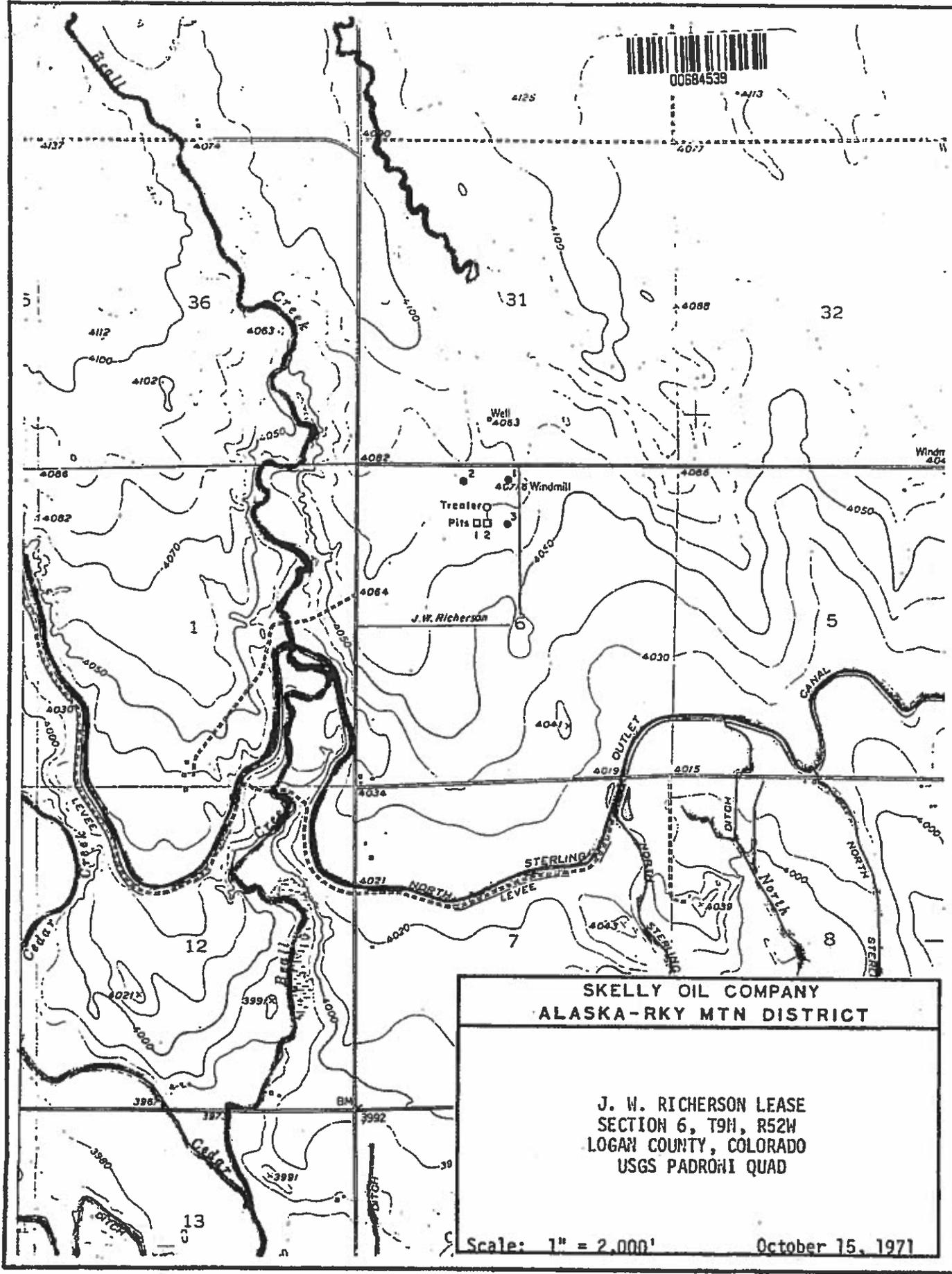
HALLIBURTON SERVICES

By P. W. McLean

fk

NOTICE:

This report is limited to the described sample tested. Any person using or relying on this report agrees that Halliburton shall not be liable for any loss or damage whether due to act or omission resulting from such report or its use.



SKELLY OIL COMPANY
ALASKA-RKY MTN DISTRICT

J. W. RICHERSON LEASE
SECTION 6, T9N, R52W
LOGAN COUNTY, COLORADO
USGS PADRONI QUAD

Scale: 1" = 2,000' October 15, 1971



00684540

MEMORANDUM

TO: D. V. Reagin

FROM: C. G. McDermill

On September 27, 1972, I drove to the Padroni West Field, Logan County.

Skim on E. W. Richardson lease, NE NW 6-9N-52W. One pit 125' X 100' X 6', clean, water. One pit 130' X 125' X 6', clean, water. Top of sandstone "J" sand. Several water wells in area. Nearest creek approximately 3/4 mile west. No alluvium. White River on surface. Top of Sierra Shale approximately 250'. No problem at this time.

5/2/74 - GCH: 1 - Skim pit, 12'sq., wire screen cover, 100% oil
Pit 1 - 70'sq., uncovered, fenced, 98% clean water, 2% oil in weeds of 1 corner.
Pit 2 - 70'sq., uncovered, fenced, all clean water, no oil.

9/25/74, GCH: 1 - Skim pit, 12'sq., wire screen cover, 100% oil
1 - new skim pit, 12x30x8, as yet uncovered, empty, dry, clean.
Pit 1 - 70-80'sq., uncovered, unfenced, floating styrofoam & hose barrier across 1/2 of pit facing skim pit, all clean water no oil.
Pit 2 - 70-80'sq., uncovered, unfenced, all clean water, no oil. Pits are fenced.

Appendix I



OIL AND GAS CONSERVATION COMMISSION OF THE STATE OF COLORADO

DECEMBER FEB 14 1961

PRODUCERS CERTIFICATE OF CLEARANCE AND AUTHORIZATION TO TRANSPORT OIL OR GAS FROM A LEASE

32490 (Instructions for filing on reverse side)

Lease Arthur Sindt Well No. 4 Field West Padroni

Sec. 7 Twp. 9 N Range 52 W County Logan Pool "O"

Producer or Operator Sinclair Oil & Gas Company

Address all Correspondence concerning this form to: A. B. Parker

Street P. O. Box 9 City Fort Morgan State Colorado

The above named producer or operator hereby authorizes Western Crude Marketers, Inc. (Name of Transporter)

Whose principal place of business is 1700 Broadway Denver 1 Colorado (Street) (City) (State)

And whose field address is P. O. Box 704, Sterling, Colorado

to transport 100% of the oil or gas produced from the lease designated above until further notice.

Other transporters transporting oil or gas from this lease are:

None %

REMARKS:

NEW WELL COMPLETION

Date of First Production December 20, 1960 by swab - First Run 1-11-61.

Production gauge on 24 hour basis 62 Bbl. Oil; 2 1/2 % Water;

Too small to measure Mcf Gas.

The undersigned certifies that the rules and regulations of the Oil and Gas Conservation Commission of the State of Colorado have been complied with except as noted above and that the transporter(s) is (are) authorized to transport the percentage of oil and/or gas produced from the above described lease and that this authorization will be valid until further notice to the transporter named herein or until cancelled by the Colorado Oil and Gas Conservation Commission.

Executed this 10th day of February, 1961

Approved:

FEB 16 1961

Date

Director [Signature]

Sinclair Oil & Gas Company

(Producer or Operator)

A. B. Parker

District Superintendent

(Title)

AJ	
DVR	
WRS(A/Plant)	
HHM	
JAM	
FJP	✓
JJD	✓
FILE	

73

✓

INSTRUCTIONS

Each producer or operator of any oil or gas well completed after April 30, 1956, shall file with the Commission, as soon as practicable, a "Producer's Certificate of Clearance," Form 10, in triplicate, for each well producing oil or gas or both oil and gas. If requested by the Commission, a Certificate of Clearance shall be filed for any lease from which oil, gas or other hydrocarbon is being produced. A separate certificate shall be filed for each transporter authorized to transport oil, gas or other hydrocarbon from said producing lease or newly completed well.

After a certificate has been approved by the Colorado Oil and Gas Conservation Commission, one copy shall be forwarded to the transporter; one copy returned to the producer or operator; and one copy retained by the Colorado Oil and Gas Conservation Commission.

A new certificate shall be filed to cover each change in the producer or operator filing the certificate and each change in the transporter, except that in the case of a temporary change in the transporter involving less than the production for one month, the producer or operator shall, in lieu of filing a new certificate, notify the Colorado Oil and Gas Conservation Commission, and the transporter authorized by certificate on file with said Commission, by letter of the estimated amount of oil and/or gas to be moved by the transporter temporarily moving oil and/or gas from the lease and the name of such temporary transporter and a copy of such notice shall also be furnished such temporary transporter. Such temporary transporter shall not move any more oil than the estimated amount shown in said notice.

This certificate when properly executed and approved by the Colorado Oil and Gas Conservation Commission shall constitute an authorization to a Pipe Line or other carrier to transport oil or gas from the lease named therein and shall remain in full force and effect until,

- (A) There is a change in the producer or operator filing the certificate, or
- (B) The transporter is changed, or
- (C) The authorization is cancelled by the Colorado Oil and Gas Conservation Commission.

If any of the rules and regulations of the Colorado Oil and Gas Conservation Commission have not been complied with at the time this report is filed, explain fully under the heading: "REMARKS."

In cases where this certificate is filed to cover a change in the producer or operator or a change in the transporter designated to move oil or gas, show under "REMARKS" the previous producer or operator and the transporter previously authorized to transport oil or gas.

A separate report shall be filed to cover each producing lease as designated by the Colorado Oil and Gas Conservation Commission.

OGCC 1
Rev.



STATE OF COLORADO
OIL AND GAS CONSERVATION COMMISSION
DEPARTMENT OF NATURAL RESOURCES

Indicate for Patented and Federal lands.
Indicate for State lands.

FOR OFFICE USE			
ET	FB	UC	SE

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir.
Use "APPLICATION FOR PERMIT—" for such proposals.)

1. OIL WELL <input checked="" type="checkbox"/> GAS WELL <input type="checkbox"/> OTHER <input type="checkbox"/>	5. LEASE DESIGNATION & SERIAL NO.
2. NAME OF OPERATOR Hondo Oil & Gas Company	6. IF INDIAN, ALLOTTEE OR TRIBE NAME
3. ADDRESS OF OPERATOR 341 E. "E", Suite 200, Casper, WY 82609	7. UNIT AGREEMENT NAME
4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements. See also spaces 17 below.) At surface At proposed prod. zone NE NE Section 7, T9N-R57W 52W	8. FARM OR LEASE NAME Arthur Sindt
14. PERMIT NO.	9. WELL NO. #4
15. ELEVATIONS (Show whether DF, RT, GR, etc.) 4016 GL.	10. FIELD AND POOL, OR WILDCAT West Padroni
	11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA Sec 7, T9N-R57W 52W
	12. COUNTY Logan
	13. STATE Colorado

16. Check Appropriate Box To Indicate Nature of Notice, Report or Other Data

NOTICE OF INTENTION TO:		SUBSEQUENT REPORT OF:	
TEST WATER SHUT-OFF <input type="checkbox"/>	PULL OR ALTER CASING <input type="checkbox"/>	WATER SHUT-OFF <input type="checkbox"/>	REPAIRING WELL <input type="checkbox"/>
FRACTURE TREAT <input type="checkbox"/>	MULTIPLE COMPLETE <input type="checkbox"/>	FRACTURE TREATMENT <input type="checkbox"/>	ALTERING CASING <input type="checkbox"/>
SHOOT OR ACIDIZE <input type="checkbox"/>	ABANDON <input type="checkbox"/>	SHOOTING OR ACIDIZING <input type="checkbox"/>	ABANDONMENT* <input type="checkbox"/>
REPAIR WELL. (Other) <input type="checkbox"/>	CHANGE PLANS: <input type="checkbox"/>	(Other) Spill <input checked="" type="checkbox"/>	

(Note: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)

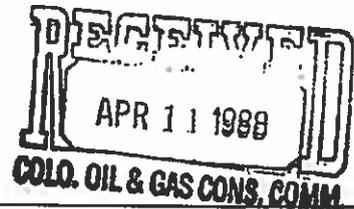
17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)

18. Date of work 4-5-88 * Must be accompanied by a cement verification report.

4-4-88 Flowline leak occurred on 4-4-87 leak discovered by Unocal Pipeline Plane at 2:45 p.m. Unocal called and reported leak to Casper Office. I notified pumper who immediately shut well in. Leak is on private surface. Discharge amount 5 BO "O" Sand crude with 25-30 BBLs produced water.

4-5-88 Reported to Dennis Bickwell 1-303-894-2100 8:05 a.m. Colorado Oil & Gas Comm. Called out backhoe and vac truck dig out and repair leak in line. Vac truck picked up 3 BO 20 BW.

4-6&7-88 Backhoe and dump truck cleaned up rest of oil unable to pickup with vac. Truck hauled off oily dirt then hauled in fresh top soil. Clean up completed 4-7-88.



19. I hereby certify that the foregoing is true and correct

PRINT Blaine Hampton

SIGNED [Signature] TITLE Foreman DATE 4-8-88

(This space for Federal or State office use)

APPROVED BY [Signature] TITLE SUPR. PETROLEUM ENGINEER DATE APR 12 1988

CONDITIONS OF APPROVAL, IF ANY:

H



STATE OF COLORADO
CONSERVATION COMMISSION
OF NATURAL RESOURCES

in duplicate for Patented and Federal lands.
in triplicate for State lands.

FOR OFFICE USE			
ET	FE	UC	SE
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir.
Use "APPLICATION FOR PERMIT—" for such proposals.)

1. OIL WELL <input checked="" type="checkbox"/> GAS WELL <input type="checkbox"/> OTHER <input type="checkbox"/>		5. LEASE DESIGNATION & SERIAL NO.	
2. NAME OF OPERATOR Hondo Oil & Gas Company		6. IF INDIAN, ALLOTTEE OR TRIBE NAME	
3. ADDRESS OF OPERATOR 341 E. "E", Suite 200, Casper, WY 82609		7. UNIT AGREEMENT NAME	
4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements. See also space 17 below.) At surface At proposed prod. zone NE NE Section 7, T9N-R52W		8. FARM OR LEASE NAME Arthur Sindt	
14. PERMIT NO.		9. WELL NO. #4	
15. ELEVATIONS (Show whether DF, RT, GR, etc.) 4016 GL		10. FIELD AND POOL, OR WILDCAT West Padroni	
		11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA Section 7, T9N-R52W	
		12. COUNTY Logan	
		13. STATE Colorado	

18. Check Appropriate Box To Indicate Nature of Notice, Report or Other Data

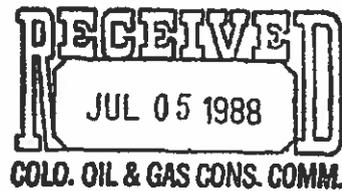
NOTICE OF INTENTION TO:		SUBSEQUENT REPORT OF:	
TEST WATER SHUT-OFF <input type="checkbox"/>	FULL OR ALTER CASING <input type="checkbox"/>	WATER SHUT-OFF <input type="checkbox"/>	REPAIRING WELL <input type="checkbox"/>
FRACTURE TREAT <input type="checkbox"/>	MULTIPLE COMPLETE <input type="checkbox"/>	FRACTURE TREATMENT <input type="checkbox"/>	ALTERING CASING <input type="checkbox"/>
SHOOT OR ACIDIZE <input type="checkbox"/>	ABANDON <input type="checkbox"/>	SHOOTING OR ACIDIZING <input type="checkbox"/>	ABANDONMENT* <input type="checkbox"/>
REPAIR WELL <input type="checkbox"/>	CHANGE PLANS <input type="checkbox"/>	(Other) <u>Spill</u> <input checked="" type="checkbox"/>	

(Note: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)

18. Date of work June 27, 1988 * Must be accompanied by a cement verification report.

Flowline leak was discovered by our pumper at 8:30 a.m. He shut the well in notified Hondo Oil in Casper. Discharge amounted to 10 bbls "O" Sand Oil and 30 to 40 bbl produced water. Reported to John McKee at 10:30 a.m. with Colorado Oil & Gas Commission at 1-303-894-2100. Obtained permission at that time to burn due to tall grass. Called Bill Smith our pumper called the local fire department. They granted permission to burn spill. Spill area was burned and residue was scaped and fresh dirt hauled in. The spill did not get in or reach any water. Cleanup completed 6-27-88.



19. I hereby certify that the foregoing is true and correct

PRINT Blaine Hampton

SIGNED R. B. Hampton TITLE Field Foreman DATE 6-29-88

(This space for Federal or State office use)

APPROVED BY J. A. [Signature] TITLE SUPR. PETROLEUM ENGINEER DATE JUL 08 1988

CONDITIONS OF APPROVAL, IF ANY:



RECEIVED
JUN 28 1995

5

SPILL/RELEASE REPORT FORM

Date/Time of Report: 6-26-95 2:41 pm Form Completed by: Ed Brinkley Input to COGIMS 6-27-95

Spill/Release Reported By: Kyle Schoemaker, Logan City Commissioner 522

Name: Bench Petroleum Company: Bench Petroleum Phone: 405-840-1811
Address: Hwy 902 Oklahoma City, OK
Time of Occurrence: 6-23-95 Contact on spill cleanup: Les Jackson, Starling 522-5898

Location of Spill/Release: ✓ NENE 7-9N-52W

Legal Description (1/4 1/4 S T R PM): NENE 7-9N-52W Lease/Field Name: Pulroni 07ND
Well Name: S,ndt-4 API #: 075-06603
Address or Verbal Location: County: Logan
Type of Facility: (Tank battery, flow line, pit, injection well, etc)
Flowline crossing irrigation ditch

What Happened:

Provide a detailed description of the spill/release incident, include cause (equipment failure, Human error):
Line rupture
Substance Spilled (Crude Oil, Condensate, Produced Water, Chemicals, or Injection Water): OSND Crude
Volume Spilled: 5-10 bbl. ? Volume Recovered: 75% Contained in Berm? Soaked into soil?
*Spill requires followup by Env't Group (see checklist)

Existing Conditions:

Immediate threat? Land use (irrigated crops, pasture, commercial):
Areal extent and depth: North Starling Irrigation District 970 522-2025
Nearby buildings or water wells and distance?
Weather conditions:
Proximity to surface water, wetlands, and depth to shallow groundwater:
Surface water in N. Starling canal was minimal at time of spill.

Corrective Action:

Describe the response to the spill/release (how stopped, contained and recovered):
Pump shut down
Cleanup/removal of remaining contamination:
Vacuum truck, roxstabout crew on 6-24-95.
Delineation of extent of contamination: Residue stuck on rocks in ditch believed to be stationary. Ditch foreman said
Prevention measures implemented for future situations: Repair line. the job looked good.

Notifications:

List the parties and agencies notified (COGCC, County, LEPC, BLM, DOT, EPA or other).

Date	Agency:	Contact Person:	Response:
6-27-95	OGCC	Ed Brinkley	@ Battery
6-26-95	Logan Comm.	Kyle Schoemaker	
6-26-95	OGCC	Ed Brinkley	@ Canal. Field visit 6-27-95
6-26-95	OGCC	John Aris	message - he one in @ Enviro group.
6-27-95	OGCC	Deb	10:30am discussed event.

cc: Mara