pounds (221,000 bbl) from a chlor-alkali plant, associated with previously injected wastes (874,000 bbl) from production of the herbidices 2, 4-D, and MCPA.

The depths of injection intervals range from 1,448 to 4,692 ft. The maximum total depth of a disposal well in Saskatchewan is 5,536 ft. Average injection rates are from 3 to 1,100 US gpm and average well-head pressures vary from the sole influence of gravity to 1,750 psig. More than 44.13% of all industrial wastes injected into the Saskatchewan subsurface are received by clastic aquifers. In 18 injection systems, clastic units (Cambrian and Ordovician; Lower Cretaceous) are the disposal intervals, whereas 13 wells have been completed for disposal into carbonate units (Silurian to Mississippian). There are four multizone completions, each involving disposal of potash brines into a Silurian carbonate aquifer and an Ordovician clastic aquifer. In three disposal systems, mercury compounds are permitted to accumulate in caverns in Devonian evaporite strata.

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ANALYSIS OF ENERGY CRUNCH AND APPLICATION OF COMPUTER TECHNIQUES TO SEARCH FOR OIL AND GAS

No abstract available.

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COMPARISON OF RECENT LABORATORY MODELS TO NATURAL DEFORMATION IN ROCKY MOUNTAIN FORELANDS

Several years ago for the first time the technique for experimental folding of layered real rocks under conditions expected within sedimentary basins was developed in our laboratory. In the initial experiments the samples had to be loaded parallel with the layering simulating horizontal compression. Though these experiments produced many insights into the overall folding process, they are not representative of most folds in the Rocky Mountain forelands where the folds result from differential vertical movements of the basement. However, within the last year the technique has been modified to produce loads at high angles to the layering and now we can produce a form of drape folding that does, indeed, have much in common with folds in the Rocky Mountain foreland. Making one-to-one correlations of simplified laboratory experiments to complicated natural features can be fraught with danger and completely misleading. However, these experiments verify so many long suspected natural phenomena that selected comparisons may be significant.

Scale alone precludes complete observation of natural folds with thousands of feet of displacement, but if correlations to experimentally created folds can be validated, the overall fold process becomes subject to direct observation. Such observations lead to increased confidence in delineation of structural geometries on the natural scale. This is especially true for the more complicated fold forms that usually have to be predicted in the subsurface from limited exploration data. It is gratifying to see that the overall movements in the experiment correlate well with natural folds, because it allows us to develop conceptual models upon which we can draw when dealing with widespread subsurface control or masked seismic data.

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CHURCH BUTTES ARCH, WYOMING AND UTAH

The Church Buttes arch extends from the Bridger Lake field in northern Utah northward through the Church Buttes field to the Big Piney-LaBarge field in southwestern Wyoming, a distance of approximately 120 mi. The arch is considered an overthrust structure. Deformation of the Absaroka thrust zone and the Church Buttes arch occurred during the Late Cretaceous as the result of the same tectonic forces. Folding of the arch resulted in localization of oil and gas accumulations in Mesozoic and Paleozoic rocks. Oil and gas production from combination structural-stratigraphic traps, directly related to the folding of the arch, has been established in the Cretaceous Frontier, Bear River, and Dakota Formations, and the Pennsylvanian Morgan Formation. Continued exploration of the arch should result in additional discoveries in both Mesozoic and Paleozoic rocks.

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WESTERN COAL—CLEAN BLACK ACE IN THE HOLE

In 1973 oil and gas supplied 77% of America's energy, 19% came from coal, less than 5% from nuclear, hydroelectric, and other sources.

Oil and gas make up only 9% of our domestic fossil fuel reserves. Oil shale accounts for 15% and coal 74%. For a nation facing future energy shortages, this arithmetic should tell a story. Sixty-four percent of our domestic coal reserves are in the Dakotas and Rocky Mountain States.

Barely 10 years ago the major oil companies first started a programmed acquisition of western coal resources for the synthetic fuel-from-coal industry. The recent dramatic changes in the price structure of U.S. fossil fuels now make synthetic gas and liquids from coal competitive with traditional supplies.

Coal is not difficult to find. The geology of coal in the western basins is generally simple. Western coal's problems have been geography, economics, and politics.

About 80% of western coal lies under the public domain. Indecision and politics have resulted in a three-year freeze on Federal coal leasing. This has slowed down the timetable for western coal's contribution to the national energy mix.

Western coal's assets are low mining costs and low sulphur. Present resource acquisitions are almost exclusively strippable deposits. Nevertheless, only about 5% of western coal can be surface mined economically with present equipment. The real future may well lie in the development of techniques to mine clean energy from the 95% of the coal reserves which are underground.

For instance, a tract of land 10 mi long and 5 mi wide in the Powder River basin of Wyoming contains more coal Btu's at a depth of 1,000-2,000 ft than all the known oil reserves in the U.S.—onshore, offshore, and the North Slope of Alaska. Herein may be the challenge and the biggest opportunities. For an