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THE DEVELOPMENT OF SYNTHETIC FUELS: A LEGAL AND POLICY ANALYSIS

Lewis D. Solomon*
Donald B. Mitchell, Jr.**

I. INTRODUCTION

The near disaster at Three Mile Island and the movie The China Syndrome brought to public attention the dangers inherent, even if remote, in the use of nuclear power to secure our nation’s energy future. The drawbacks which have become apparent in the use of nuclear power have cast doubts on its utility as a source of energy. No longer does nuclear power appear as the panacea to the nation’s energy needs.

After the dramatic petroleum price boost and the gasoline shortages in 1979, President Carter turned to coal as the American solution to the energy crisis. In its solid form coal can replace nuclear fuel as a source of electricity. Converted to a liquid state, it—together with oil shale—is known as synthetic fuel and can reduce American dependence on imported oil.

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1. In addition to the risk of nuclear accidents, there is the unresolved problem of the long-term disposal of highly toxic, radioactive nuclear wastes. Because of their toxicity and extremely long half-lives, around a quarter million years, the wastes must be kept under perpetual surveillance. Moreover, there are other non-technological problems such as the fear of theft, sabotage, and proliferation.
In June, 1980, the Energy Security Act\(^2\) was enacted, creating the United States Synthetic Fuel Corporation\(^3\) (Corporation), to promote an $88 billion program cast in the form of a government-business partnership. The federal government would allocate capital within the private sector, using incentives to induce industry into constructing plants to produce synthetic oil or gas from coal or oil shale. Such incentives would include loan guarantees made to energy firms by private banks, agreements to purchase synthetic fuel, and price guarantees to producers. With the management of shale and coal projects in private hands, the target is 500,000 barrels of oil-equivalent daily, by 1987. By 1992, production would be increased to two million barrels a day, approximately one-third of current petroleum imports, from forty plants each capable of producing 50,000 barrels per day.

Four major legal, technological, economic, and political issues stand out in a synthetic fuels policy. These issues are the topic of this Article.

First, the economics of synfuels policy are problematic. Large scale organization and technology are required in the synthetic fuels era. A plant capable of producing 50,000 barrels of oil-equivalent daily costs between two and three billion dollars (in 1980 dollars). Undoubtedly, the investments necessary for synfuels development will divert capital from the other sectors of the economy. In addition to the investment cost, synfuels technology may involve further costs if improvements are made in untested processes. Nevertheless, investments in synfuels are unlikely to over-burden the nation’s capital markets or displace other investments. Bankers Trust Company has concluded that “energy financing will not prove disruptive to the credit and capital markets, even if the energy industries become more reliant on outside sources of funds.”\(^4\) Moreover, the Congressional Budget Office, speaking specifically of synfuels, noted that the impact of the additional synthetic fuels investment on the capital market would be minimal.\(^5\)

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5. “Given the fact that U.S. investment in total plant and equipment is in excess of $200 billion per year, the impact of the additional synthetic fuel investment on the capital market
Second, it must be ensured that the Corporation operates efficiently and is accountable to the public. Will periodic congressional review of the Corporation’s actions guarantee the economic, technological, and political legitimacy of the Corporation and synfuels development? Like any government-business partnership, skepticism exists as to how the Corporation will select projects, its potential sensitivity to political pressures, creeping and endemic bureaucratic inefficiency, and its professional expertise. These are issues of serious concern. This Article explores the structure of the Corporation and examines the relationship between the Board of Directors and officers as well as the relationship between the Board and Congress. The decision-making processes and criteria are analyzed and areas of legal concern are noted. The nature of quasi-public corporations, the responsibilities of the Corporation directors and the Inspector General are also discussed and the Corporation is examined in light of modern legal policy analyses of corporate structure and responsibility.

Third, the synfuels technology is complex and still undeveloped. A section of this Article explains in layman’s terms the concepts of gasification and liquefaction of coal and shale.

Fourth, like all complex hydrocarbon technology, the environmental problems and their legal corollaries are significant, complicated, and interrelated. A major section of this Article examines the various environmental obstacles and dangers and studies the legal framework in which these problems, hopefully, will be addressed. These problems include air and water pollution, mining and reclamation, waste disposal, and ground-water pollution.

II. UNITED STATES SYNTHETIC FUELS CORPORATION

A. Corporate Organization

1. The Players Involved

Four centers of power exist in the United States Synthetic Fuels Corporation. Two of these are traditional, two are not. Among the former are the Board of Directors, its Chairman, and the officers of the Corporation. Among the latter are an Inspector General, assigned to oversee the integrity of the Corporation, and the Advisory Committee, composed of several cabinet members assigned to give policy guidance.
What follows is a discussion of the roles of these four players and an evaluation of the Corporation’s structure in light of the theories of American legal reformers concerning social responsibility and effective management of the modern corporation.

The United States Synthetic Fuels Corporation, which has its principal office in the District of Columbia and is deemed to be a resident of the District of Columbia, has a seven member Board of Directors. All powers of the Corporation are vested in the Board of Directors as a whole, except for those vested specifically in the Chairman of the Board. Each of the six directors, plus a specially designated Chairman, are appointed by the President of the United States with the advice and consent of the Senate. No more than four directors can be members of any one political party. The Chairmanship is a full-time position and its occupant is prohibited from holding any other salaried occupation. The other six directors can be either full-time or part-time, the determination to be made by the President as a condition of employment. Directors serve seven year terms and may be removed by the President only for neglect of duty or malfeasance in office. Vacancies are filled by Presidential appointment until the end of the term, again with the advice and consent of the Senate.

Three sources of authority can require meetings of the Board of Directors. First, The Synthetic Fuels Corporation Act of 1980 requires that the Board meet at least quarterly. Second, the by-laws of the Corporation may require periodic meetings. Third, the Act also provides that the Board “shall meet at any time pursuant to the call of the Chairman.” A majority of the entire Board, four, is required for a

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10. Id.
11. Id.
12. Id. § 116(c), 42 U.S.C.A. § 8712(c).
13. Initial terms are for periods ranging from one to seven years, one expiring each year so as to create a staggered term. Id. § 116(b)(1)(2), 42 U.S.C.A. § 8712(b)(1)(2).
15. Id. § 116(b)(2), 42 U.S.C.A. § 8712(b)(2).
16. This is the name given to Title I, Part B of the Energy Security Act. Id. § 111, 42 U.S.C.A. § 8701 note.
17. Id. § 116(e), 42 U.S.C.A. § 8712(e).
18. Id. The by-laws are adopted by the Board pursuant to id. § 171(a)(1), 42 U.S.C.A. § 8771(a)(1).
19. Id. § 116(e), 42 U.S.C.A. § 8712(e).
The same majority is required for the corporation to take any action. A majority of the quorum is *not* sufficient for Corporation action. Board meetings are to be public although the Board may close a meeting if such a meeting is likely to disclose information inclined to adversely affect the securities markets or interfere with the Corporation’s ability to choose grant recipients and conduct negotiations or when conducting business which falls within an exception to the open meeting requirements of the Sunshine Act. Finally, pay for directors is set by the President and later adjustments are made by the Board with the concurrence of the President.

The corporate officers are immediately subordinate to the Board. Congress mandates only that there be a treasurer and a general counsel. The Chairman of the Board also acts as the chief executive officer of the Corporation. Salary levels of the officers are set by the Board which is allowed to fix salaries above the levels paid to senior government officers if the President does not object. The Chairman, not the Board, is authorized to appoint and to discharge employees. Directors, officers and employees are not subject to laws related to government employment and thus have no civil service status or protection. The Statute is silent as to removal of officers and the cause necessary for removal of both officers and employees. The structure of the Act, however, helps answer these questions. As previously noted, employees are both hired and fired by the Chairman. Since officers are appointed by the full Board, consistency mandates removal by the Board. Cause for removal does not seem to be required. While the Statute requires cause for removal of directors, it is silent regarding
officers and employees. This, coupled with the removal of civil service protection, indicates that, in this respect, the Corporation is operated like a private corporation.\textsuperscript{32} Two caveats are necessary, however. First, both appointment and removal on the basis of a political test are expressly forbidden.\textsuperscript{33} Second, the "state action" doctrine covers certain actions of the Corporation.\textsuperscript{34} This extends constitutional protections into some areas of the Corporation's activities.\textsuperscript{35}

The Statute proceeds to set out standards for fiduciary behavior by directors, officers and employees.\textsuperscript{36} These standards are directed towards disclosure. Specifically, the Statute requires\textsuperscript{37} that all directors, officers, and employees at a salary level equivalent to the federal government's GS-16 level conform to the financial disclosure requirements of the Ethics in Government Act of 1978.\textsuperscript{38} Additionally, the Ethics in Government Act provisions relating to post-government employment\textsuperscript{39} apply to Corporation directors, officers, and employees when they leave the Corporation.\textsuperscript{40} The Ethics in Government Act, however, does not apply to other federal employees who join the Corporation and they may represent that Corporation before their old agency.\textsuperscript{41} Finally, a director is not allowed to vote on any matter before the Corporation in which he directly or indirectly has a financial interest.\textsuperscript{42} This provision, however, can be waived by a majority of the Board, excluding the in-


\textsuperscript{33}. Energy Security Act, supra note 2, § 117(e), 42 U.S.C.A. § 8713(e) (West Supp. 1980).


\textsuperscript{35}. The Conference believed that constitutionalization could occur when the Corporation performed "such functions as (a) pledging the full faith and credit of the United States with respect to financial assistance agreements or (b) performing 'significant governmental duties' . . . ." Id. (citing Buckley v. Valeo, 424 U.S. 1 (1976)).


\textsuperscript{37}. Energy Security Act, supra note 2, § 118(a), 42 U.S.C.A. § 8714(a) (West Supp. 1980).


\textsuperscript{39}. Former federal employees may not knowingly represent any person, even informally, or attempt to influence through any communication, any department in connection with any proceeding in which the United States has an interest and in which he was personally and substantially involved. The penalty for violation is a maximum of $10,000 fine and/or two years imprisonment. 18 U.S.C. § 207(a), (c) (Supp. III 1979).

\textsuperscript{40}. Energy Security Act, supra note 2, § 118(d), 42 U.S.C.A. § 8714(d) (West Supp. 1980).

\textsuperscript{41}. Id. § 118(b), 42 U.S.C.A. § 8714(b).

\textsuperscript{42}. For example, a director is prohibited from voting on a matter before the Corporation in which a relative or a corporation in which he is involved has a financial interest. Id. § 118(c)(1), 42 U.S.C.A. § 8714(c)(1).
interested director, after complete disclosure to the Board. Violation of
this disclosure requirement is cause for removal.

The Corporation also has an Inspector General who has very broad powers and independence. He is to enforce both the conflict of interest provisions discussed above and all the other facets of corporate activity. The responsibilities of the Inspector General do not end at fraud-related issues, but extend to supervision of corporate procedures and efficiency. The Inspector General is appointed by the President with the advice and consent of the Senate for a seven year term. His appointment is to be based solely on his integrity and demonstrated ability. While he reports to and is generally supervised by the Board, no one may interfere with his activities. He is removable only for malfeasance or neglect of duty, and only by the President, who must subsequently report to Congress concerning the reasons for the removal. The Inspector General is to make an annual report to the Board including his recommendations, which is to be forwarded to Congress. The Inspector General has access to all information available to the Corporation relevant to his responsibilities. He may also "request" such information from all levels of government and has broad subpoena power, enforceable in United States district courts, to obtain the information necessary to fulfill his functions under the Act.

The last major player in the Corporation is the Advisory Committee. This Committee, composed of the Secretaries of the Departments of Defense, Treasury, Energy, and Interior as well as the Administrator of the Environmental Protection Agency and the Chairman of the Energy Mobilization Board, meets with the Board at least every six months. Its main function is to provide general policy advice and to

43. Id. § 118(c)(3), 42 U.S.C.A. § 8714(c)(3).
44. Id. § 118(c)(2), 42 U.S.C.A. § 8714(c)(2).
45. Id. § 122(a), 42 U.S.C.A. § 8718(a).
47. Id. § 122(b)(1)(C), 42 U.S.C.A. § 8718(b)(1)(C).
49. Id.
50. Id. § 122(a)(2), 42 U.S.C.A. § 8718(a)(2).
52. Id. § 122(c),(d), 42 U.S.C.A. § 8718(e),(d).
53. Id. § 122(e)(1), 42 U.S.C.A. § 8718(e)(1).
54. Id. § 122(e)(2), 42 U.S.C.A. § 8718(e)(2).
55. Id. § 122(e)(3), 42 U.S.C.A. § 8718(e)(3). The subpoena power presumably extends to private citizens who do business with the Corporation.
56. Id. § 123(b), 42 U.S.C.A. § 8719(b).
57. Id. § 123(c), 42 U.S.C.A. § 8719(c).
review forthcoming Corporation solicitations for proposals.\textsuperscript{58}

The Chairman of the Board can delegate, in writing, to other Board members or officers any of his exclusive powers.\textsuperscript{59} By contrast, the Board has approximately twenty decisional powers that it may not delegate either to the Chairman or to committees of directors.\textsuperscript{60} Likewise, the Executive Branch may not delegate its powers to the Corporation.\textsuperscript{61}

2. Management and Accountability of the Corporation

Persons interested in what has often been perceived as the social irresponsibility of American corporations have frequently turned to an examination of the structure of corporations to determine the source of the perceived malevolence. Inevitably, their eyes focus on the boards of directors as both the present problem and the potential solution.

A study\textsuperscript{62} summarizing many of these theories has found three essential problems with the present role of boards of directors. First, persons appointed as directors usually are not independent of either the corporation they are to "direct" or the ethos of top corporate officialdom.\textsuperscript{63} They are products of the same socioeconomic elite that they are to direct. Second, present directors spend insufficient time at their directorships. They often treat the directorship as a "five times per year" affair, concentrating instead on their own executive or professional jobs, the jobs that initially carried them into the corporate elite.\textsuperscript{64} Third, scholars have perceived that a lack of access to information effectively prevents directors from being effective in an age and society where information is power.\textsuperscript{65}

\textsuperscript{58} Id. § 123(a), 42 U.S.C.A. § 8719(a).
\textsuperscript{59} Id. § 119(a), 42 U.S.C.A. § 8715(a).
\textsuperscript{60} Id. The powers that may not be delegated are enumerated. Generally, these powers relate to the most important business decisions of the Corporation—who gets what and why. Given that these day-to-day business decisions are non-delegable and that four members of the Board must favor all actions, the appointment of part-time directors, as allowed by \textit{id.} § 116(c), 42 U.S.C.A. § 8712(c), does not seem wise; indeed, it may paralyze the activities of the Corporation.
\textsuperscript{61} Notwithstanding any other provision of law, the President and any other officer or employee of the United States shall not make any delegation to the Chairman, the Board of Directors, or the Corporation of any power, function, or authority not expressly authorized by the provisions of this part, except where such delegation is pursuant to an authority in law which expressly makes reference to this section.
\textsuperscript{63} Id. at 584.
\textsuperscript{64} Id. at 585.
\textsuperscript{65} Id.
Two common proposals for reform, both of which we reject, are mere changes in the role of the Board. It is urged that directors should either be "monitors" or "adversaries" of the full-time management. Such a role change, however, does little to solve any of the three major problems discussed above; rather, "oversight" is already the situation while an adversary role is ill-suited to men who are members of the same clubs and veritable brothers in philosophy and politics.

Other "non-role" solutions have also been proffered—"special constituency" directors and increased use of board committees to concentrate responsibilities and powers. The first is fraught with problems of diffusion of purpose; the second with removal of responsibility from non-committee member directors. The solution is to increase responsibility not diffuse or remove it.

Two other solutions have also been proffered, both more radical and directed at structure and responsibility rather than role. First, the appointment of limited numbers of outside public directors with increased powers and responsibility has been suggested by Professor Christopher Stone. Second, the appointment of professional directors has been advocated.

In this section these two recommendations are examined in light of the structure of the Corporation, and it is concluded that Congress, perhaps unintentionally, has adopted many of the reformers' recommendations. The Inspector General's role and its managerial function of information gatherer and independent force within the Corporation are also examined.

a. The Professional Director

At least three qualities are necessary for an effective and successful director. First, a director should be knowledgeable about the business world in general, his industry in particular, and the social impact of the industry's actions. Second, he should have the ability to question management closely and yet retain its professional respect. Third, the indi-
individual must have adequate time to do the job thoroughly and well.\textsuperscript{74} Clearly, only a professional director can meet all three requirements.

The position of the Chairman of the Board of the Corporation is similar to that of a professional director. It is both a full-time\textsuperscript{75} and well-paid position. The position of the other six directors is less clear. The President can make these six directors either full or part-time.\textsuperscript{76} A potential problem with the part-time director, a problem related to the Board's requirements for action, has already been noted.\textsuperscript{77} Many of the Board's activities are non-delegable and involve many of the day-to-day operations of the Corporation. Because all actions must be effected by a constitutional majority,\textsuperscript{78} the appointment of part-time directors seems unwise. Part-time appointment may also enable the Chairman, who is full-time, to overwhelm other members by superior expertise and information, resulting in the presentation of veritable \textit{faits accomplis} at rubber-stamp Board meetings. Thus it makes good political and business sense for a President to appoint only full-time directors.

b. \textit{Public Directors}

In his seminal book on corporate reform, Professor Stone notes three possible problems with "public directors" serving on boards of directors. First, he notes the problem of serving a constituency denoted as "the public"\textsuperscript{79} and resolves this problem by suggesting that an individual act as a director for the corporation and not for the fictional appointing constituency.\textsuperscript{80} In the Synfuels Corporation, it is possible to feel that the Corporation and the public are the same. Stone notes that studies of the Communication Satellite Corporation emphasized the anomaly that "public" directors, under the local law, owed their fiduciary obligations to private shareholders.\textsuperscript{81} In the Corporation, the shareholders and the constituency are the same, the energy commonwealth.

\textsuperscript{75} See supra text accompanying note 11.
\textsuperscript{76} Energy Security Act, \textit{supra} 2, § 116(c), 42 U.S.C.A. § 8712(c) (West Supp. 1980).
\textsuperscript{77} See supra note 60.
\textsuperscript{78} A constitutional majority requires the assent of four directors rather than a majority of quorum.
\textsuperscript{79} C. STONE, \textit{supra} note 70, at 131.
\textsuperscript{80} \textit{Id.} at 170-71.
\textsuperscript{81} \textit{Id.} at 157.
Stone notes, secondly, that appointing public directors to boards makes little difference if the board has no function, and if all the important decisions are made by the officers.\textsuperscript{82} The Corporation has run head-long in the opposite direction, centralizing most powers and functions in the Board and requiring only two officers, a treasurer and a general counsel. While other officers will be appointed, their powers seem severely circumscribed by a statute that concentrates effective power in the Board and forbids delegation of most decisions.\textsuperscript{83} Thus, Stone’s second problem is avoided.

Stone then proceeds to make several recommendations as to the organization, function, and powers of the public directors, many of which have been adopted by the Congress (or at least not expressly excluded).\textsuperscript{84} Organizationally, he recommends that public directors be required to spend at least half of their time on their directorships.\textsuperscript{85} We agree.\textsuperscript{86} He also recommends that directors be highly paid, at levels equivalent to that of the senior executives of the federal government.\textsuperscript{87} Again, we agree and the legislation certainly permits this.\textsuperscript{88} A third recommendation is that indemnification be limited.\textsuperscript{89} The Act fails in this area.\textsuperscript{90} The last organizational recommendation is that directors be provided with a full-time staff paid by the Corporation.\textsuperscript{91} We agree. The Statute is silent on this question but seems to contemplate such a provision in its allowance of extensive administrative costs.\textsuperscript{92}

Stone would confer several powers on public directors,\textsuperscript{93} some of which are relevant to our present discussion. He would allow public directors to inspect all records and to requisition reports on various areas of corporate activities.\textsuperscript{94} He would also enable them to prevent the firing of employees who act as whistle-blowers on the relevant director.\textsuperscript{95} All of these powers seem related to an investigatory and over-

\textsuperscript{82} Id. at 131.
\textsuperscript{83} See supra note 60.
\textsuperscript{84} C. Stone, supra note 70, at 131.
\textsuperscript{85} Id. at 160.
\textsuperscript{86} See supra text accompanying notes 74-78.
\textsuperscript{87} C. Stone, supra note 70, at 160.
\textsuperscript{88} Energy Security Act, supra note 2, § 116(g), 42 U.S.C.A. § 8712(g) (West Supp. 1980).
\textsuperscript{89} C. Stone, supra note 70, at 144-48.
\textsuperscript{90} See infra text accompanying note 163.
\textsuperscript{91} C. Stone, supra note 70, at 149-50.
\textsuperscript{92} Energy Security Act, supra note 2, § 120(a)(1)(B), 42 U.S.C.A. § 8716(a)(1)(B) (West Supp. 1980) allows $2,000,000 for reasonable and necessary administrative expenses.
\textsuperscript{93} C. Stone, supra note 70, at 171-73.
\textsuperscript{94} Id.
\textsuperscript{95} Id. See generally Solomon & Garcia, Protecting the Corporate Whistle Blower under Fed-
sight function, a function which Congress has provided to be fulfilled by a special animal, unknown in the traditional corporate zoo—the Inspector General. Thus, it is to his role we turn.

c. The Inspector General

Having already examined the powers and functions of the Inspector General,96 we seek at this point only to expand the discussion to relate this function to Professor Stone’s analysis of the public director.

Congress obviously perceived the Inspector General in much the same position that Stone perceived the public director—as a watchdog. Because the Corporation has only public directors, however, Congress felt a need to create a position independent of this power center, namely the Inspector General. As noted above, many of the public director’s watchdog powers have been given to the Inspector General, including, the power to requisition reports, to subpoena documents, and to investigate all phases of corporate activity. His office is well-staffed and well-funded and his relationship to the Board is both as supplier of information97 and as potential adversary.98 Interestingly, Congress has provided the Inspector General with greater explicit information-gathering powers than the Board. Nothing in the section creating the Board grants it access to the information given to the Inspector General. This is probably mere oversight since the Board has rights to all of the Inspector’s reports, makes all the important business decisions, and has a large administrative budget presumably including sufficient staff.

d. Conclusions on Management and Accountability

The Energy Security Act provides many of the reforms in the powers and functions of the Board that reformers have sought. Some of the reform is attributable to the public nature of the Corporation. The Act contains further theoretical advances in centralizing power at the Board level, decreasing delegation, and increasing the professionalism of potential directors.

The Inspector General is the biggest innovation. Given broad and

96. See supra text accompanying notes 45-55.
98. Id. § 122(a)(2), 42 U.S.C.A. § 8718(a)(2).
significant powers, charged with keeping the Corporation honest, he plays a role, under a different title, that has often been recommended as necessary for boards to fulfill. Impediments to his success in this function have been removed; the Inspector is not subject to supervision by any officer and not even the Board of Directors may prevent his investigations. Given sufficient administrative flexibility, the Inspector should have the resources, both fiscal and legal, to perform his task.

3. Public Information Rights

A significant difference between the Corporation and a private corporation is the expanded scope of public information rights within the former. While private corporations must disclose only what is required by federal and state securities laws, the Corporation "shall make available to the public, upon request, any information regarding its organization, procedures, requirements, and activities." This is limited by an express analogy to the confidentiality and non-disclosure provisions contained in the Freedom of Information Act. The Conference Report makes clear that, while the Freedom of Information Act is not intended to be formally invoked, "[t]he body of law developed in litigation construing the exemptions in 5 U.S.C. § 552(b) [is intended to] serve as precedent for construing the exemptive provisions of Section 117 [sic]."

4. Capitalization and Finance of the Corporation

Initial capitalization of the Corporation is limited to twenty billion dollars less amounts spent in interim programs under the Defense Production Act of 1950 and the Non-Nuclear Energy Research and Development Act of 1974. These combined amounts are limited to a maximum of approximately five billion dollars. This initial capitalization will come to the Corporation from the United States Treasury in exchange for "notes or other obligations of the Corporation." Later

99. Id. § 121(a), 42 U.S.C.A. § 8717(a).
100. Id.
in the life of the Corporation, after the expected 1984 promulgation by
the Corporation of a "comprehensive production strategy" and its
approval by Congress, an additional sixty-eight billion dollars will be
added to the Corporation's coffers.

The Corporation is forbidden to overcommit its funds. Commitments are to be valued at face value and with maximum potential liability in order to meet this budgetary control standard. For example, a loan guarantee is to be carried against this twenty billion dollar amount at its full potential loss even though underwriters' figures may show that only twenty percent of the total of all loan guarantees will be called.

For purposes of federal budgetary treatment, the Corporation is not a government agency and is hence "off-budget." The Corporation's budget is, nonetheless, reported to Congress each year with the federal budget, and costs incurred by the Treasury in financing the Corporation are included. Congressional concern for the fiscal responsibility of the Corporation, reflected in the budget-reporting requirement is also reflected in specific limitations on administrative and research costs. The Corporation is limited to thirty-five million dollars per year for administrative expenses and ten million dollars for specific outside studies of individual proposals. The idea is to force the Corporation to commit its money to synfuels development and not the creation of yet another Washington institutional edifice.

Corporate receipts are to be deposited in the United States Treasury which will act as the Corporation's bank. A quarterly financial

108. For an explanation of "comprehensive production strategy" and its import, see infra text accompanying notes 188-92.
110. Id. § 152(a), 42 U.S.C.A. § 8752(a) (West Supp. 1980).
111. Financing strategies are explored in infra text accompanying notes 234-74. It should be noted that the Corporation spends little capital initially. Rather, its methods involve the guaranteeing of venture capital or market availability, not direct capital subsidies.
113. Id. § 153, 42 U.S.C.A. § 8753.
114. Id.
115. Id.
117. Id. § 120(a)(1)(A)(ii), 42 U.S.C.A. § 8716(a)(1)(A)(ii). The $35 million is "indexed" to the inflation rate while, curiously, the $10 million is not. Id. § 120(a)(2), 42 U.S.C.A. § 8716(a)(2).
118. Id. § 154(b), 42 U.S.C.A. § 8754(b). The Corporation's funds may also be deposited in any Federal Reserve bank with the approval of the Secretary of the Treasury. Id.
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report is to be filed by the Corporation with the Department of Treasury. The Corporation is exempt from federal taxes although it is required to act as a regular corporation in several other tax-related ways. For example, it must pay local property taxes on the property it owns, pay FICA (Social Security payroll) taxes for its employees and various state mining taxes on its wholly-owned projects.

5. Unlawful Acts and Legal Status of the Corporate Entity

Subtitle G of Title I of the Energy Security Act creates several new federal criminal offenses, some intended to control the conduct of corporate officers and employees and some directed towards outsiders. Four types of action by corporate officers and employees are declared to be five-year felonies. First, embezzlement of corporate funds is forbidden. Certain methods of embezzling, such as false entries on corporate books, are also expressly forbidden. Participation in profits or benefits in any transaction involving the Corporation, commonly known as kickbacks, is also forbidden. Finally, insider trading, usually controlled under rule 10b-5 of the Securities and Exchange Commission, is made a serious felony. Violations can occur by the passing of insider information, even if no trading occurs. Conspiracy to engage in any of the above acts is also forbidden and is punishable in the same way as the prohibited act. False statements by applicants (or by others if for the purpose of influencing an application) to the Corporation are treated as felonies. Additionally, forgery or alteration of any corporate document or contract as well as attempting to pass or utter any forged or altered document is treated as a felony and is subject to punishment by a five-year prison sentence.

In addition to the criminal penalty, the Corporation is given express standing to sue in federal court for civil recovery of any losses it

119. Id. § 154(d), 42 U.S.C.A. § 8754(d).
120. Id. § 155(a), 42 U.S.C.A. § 8755(a).
121. Id. § 155(a)(1), 42 U.S.C.A. § 8755(a)(1).
122. Id. § 155(a)(2), 42 U.S.C.A. § 8755(a)(2).
125. Id. § 155(a)(2), 42 U.S.C.A. § 8755(a)(2).
129. Id. § 164, 42 U.S.C.A. § 8764.
130. Id. § 161, 42 U.S.C.A. § 8761.
131. Id. § 162, 42 U.S.C.A. § 8762.
suffers as a result of these violations and also for any profits made by offenders.\textsuperscript{132} The Corporation is also empowered to sue to enjoin the infringement of its name.\textsuperscript{133}

The Corporation is subject to suit by a wide variety of injured parties. Its unique status as a federal corporation that “shall not be deemed to be an agency of the United States”\textsuperscript{134} presents several interesting questions. Because it is not an “agency” of the United States, it is not subject to the Administrative Procedure Act.\textsuperscript{135} Thus, the provisions of 5 U.S.C. § 702, conferring standing on persons aggrieved “within the meaning of the relevant statute,”\textsuperscript{136} do not apply. Provisions of the Act itself must determine, either expressly or impliedly, persons with standing to sue.

The Act specifically confers upon the Attorney General and the Comptroller General of the United States standing to sue for “such relief as may be necessary” to prevent or terminate conduct which interferes with activities authorized by the Act.\textsuperscript{137} Further, the Attorney General or the Comptroller General may sue to force the performance of duties or responsibilities imposed by the Act.\textsuperscript{138} Finally, either may sue to remedy “actions, practices or policies” that violate the Act.\textsuperscript{139} This would presumably extend to procedural or administrative practices that would otherwise be remediable under the Administrative Procedure Act.\textsuperscript{140} The difference, however, is that individuals and private corporations have standing under the Administrative Procedure Act\textsuperscript{141} unlike section 167(a) which expressly limits standing to the Attorney General or the Comptroller General. Further, the Conference Report on the Act makes clear that “[t]he Conferees do not intend that mandamus actions would lie against the Attorney General of [sic] the Comptroller General to compel action under” this section.\textsuperscript{142} Private

\textsuperscript{132} Id. § 166, 42 U.S.C.A. § 8766.
\textsuperscript{133} Id. § 165, 42 U.S.C.A. § 8765.
\textsuperscript{134} Id. § 175(g), 42 U.S.C.A. § 8775(g).
\textsuperscript{136} Id. § 702.
\textsuperscript{137} Energy Security Act, supra note 2, § 167(a), 42 U.S.C.A. § 8767(a) (West Supp. 1980).
\textsuperscript{138} Id.
\textsuperscript{139} Id.
\textsuperscript{140} “Any agency action made reviewable by statute or any final action by an agency for which no other adequate remedy exists is subject to judicial review.” 5 U.S.C. § 704 (1976).
\textsuperscript{141} Section 702 of the Administrative Procedure Act provides that “a person suffering legal wrong because of agency action, or adversely affected or aggrieved by agency action within the meaning of a relevant statute, is entitled to judicial review thereof.” Id. § 702. Individuals and private corporations fall within the definition of a “person.” See id. § 551(2).
\textsuperscript{142} CONF. REP., supra note 24, at 231, reprinted in 1980 U.S. CODE CONO. & AD. NEWS 2077,
plaintiffs thus can sue only under section 168 of the Act or under any implied private causes of action.

Section 168 is a model of obfuscation. It confers jurisdiction upon the federal courts to hear “all civil actions.”143 Section 168 does not address standing nor define “all civil actions.” It goes on to speak explicitly of tort actions (the Federal Tort Claims Act is to apply) and actions sounding in contract (the contract must be in writing to be enforceable),144 yet these two references apparently do not define the class “civil actions.” The obvious issue is whether the term “civil actions” includes a private applicant’s suit seeking review of the Corporation’s action or procedures in denying an application in a manner similar to that provided in section 702 of the Administrative Procedure Act.145 No explicit answers to this question exist in the Conference Report but the structure and policy of the Act provide some clues.

The Supreme Court would most likely analyze the question as one involving an implied private cause of action and use the four-part test set out in Cort v. Ash.146 The first test is whether the Act was created in order to confer an “especial benefit” upon the plaintiff as opposed to the creation of a duty designed to benefit the public as a whole.147 Even if it is assumed that potential synfuels producers are the special beneficiaries of the Act, the second and third tests still provide formidable obstacles to the private plaintiff seeking to overcome the rule 12(b)(6) dismissal motion. The second test is whether Congress has explicitly or implicitly created or denied such a cause of action.148 Here, a private right has not been explicitly created, although Congress has not explicitly denied such a private claim. It has, however, explicitly denied a mandamus action against the Attorney General to force him to act under section 167(a) of the Act.149 This explicit denial could be read as also implicitly denying the availability of direct relief under

2128. The conferees noted that § 167 was patterned after a similar statute in the acts creating Comsat and Amtrak. Id.


146. 422 U.S. 66 (1975).

147. Id. at 78.


149. 422 U.S. at 78. The fourth Cort v. Ash test, however, would be met because this is not an area traditionally relegated to state law. See id.

150. See supra note 142 and accompanying text.
section 168. Logically, a potential plaintiff would not take the circuitous route of suing the Attorney General to force the latter to sue the Corporation if such jurisdiction, standing, and a claim already existed in the private plaintiff. Indeed, the third *Cort v. Ash* test, whether implying such a cause of action is consistent with the statutory scheme, leads to the same conclusion.  

The Statute takes great care to free the Corporation from Administrative Procedure Act review to allow it to act as a private corporation in its decision-making. This scheme seems to demand that actions analogous to Administrative Procedure Act review be disallowed and that legal actions be limited to those expressly conferred upon the Attorney General or the Comptroller General, those required by the Constitution, and those traditionally available against corporations such as actions in contract or business torts that would be subsumed within the term “all civil actions.”

Thus, while section 168 confers jurisdiction upon the federal courts to hear “all civil actions,” the class of civil actions should not be read to include actions analogous to judicial review of federal agency decisions. The Corporation is not subject to the Administrative Procedure Act. Further, to imply a cause of action analogous to judicial review would violate the principles of *Cort v. Ash*. Private actions challenging the fundamental policy decisions of the Corporation would violate the Congressional intent to create a non-federal, independent corporation. Actions to require the Corporation to act in a certain way or use certain decisional procedures are within the statutory authority of the Attorney General or the Comptroller General.

6. General Powers and Relationship to Other Laws

The Corporation, like other private corporations, can adopt and alter its own by-laws consistent with the Statute. It also has normal powers related to the performance of its business mission such as the

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151. 422 U.S. at 78.
152. Under § 167(a) the Attorney General may enforce the provisions of fiduciary obligations, conflict of interest mandates, requirements of a quorum and majority and, presumably, violations of Corporate by-laws. While denial of private causes of actions in these areas seems to impose insufferable oversight duties upon the Justice Department, such duties are lessened by the presence of the Inspector General and a presumption of the Corporation’s compliance with its mandate through competent General Counsel.
153. The “state action” doctrine would presumably be available to remedy unconstitutional discrimination. *See supra* notes 34-35. Traditional legal theory would not allow Congress to reduce judicial power in areas of constitutional interpretation.
power to enter into contracts,\textsuperscript{155} to engage in real estate transactions of all varieties,\textsuperscript{156} to sue or be sued,\textsuperscript{157} to hire private attorneys,\textsuperscript{158} to set salaries,\textsuperscript{159} to hire experts,\textsuperscript{160} and to set the terms by which its obligations shall be carried out.\textsuperscript{161} It is also allowed to create committees\textsuperscript{162} and to indemnify its directors and officers "as the Board of Directors may deem necessary or desirable."\textsuperscript{163} This last power is quite broad and exceeds limitations imposed by most state corporation statutes.\textsuperscript{164} The Corporation is not, however, allowed to engage in other unrelated business activities.\textsuperscript{165}

A related question is the extent of any limitations upon these broad business powers and what, if any, limitations are imposed by its status as a federally created entity. We have already noted "[t]he Corporation shall not be deemed to be an agency of the United States"\textsuperscript{166} and that "[n]o Federal law shall apply to the Corporation as if it were an agency or instrumentality of the United States, except as expressly provided" in the Synthetic Fuels Corporation Act.\textsuperscript{167} These provisions alone relieve the Corporation of the responsibilities of federal agencies under the Administrative Procedure Act and various "civil service" statutes and regulations. Additionally, the Government Corporation Control Act\textsuperscript{168} and restrictions on powerplant uses of liquid and gaseous fuels contained in the Power Plant and Industrial Fuel Use Act\textsuperscript{169} are not applicable to the Corporation.\textsuperscript{170} A special subsection\textsuperscript{171} declares that the Corporation is exempt from section 102(2)(C) of the Na-
tional Environmental Policy Act of 1969,\(^{172}\) which requires the preparation of environmental impact statements for “major Federal actions significantly affecting” the environment.\(^{173}\) The Corporation is not, however, exempted from section \(102(2)(C)\) of the National Environmental Policy Act of 1969 when it builds its own plants.\(^{174}\) Significantly, the Corporation is expressly made subject to the Davis-Bacon Act,\(^{175}\) a labor standards law. Further, projects aided by the Corporation must also comply with the Davis-Bacon Act.\(^{176}\)

B. Corporation Activities

1. In General

The Corporation is authorized to grant financial assistance\(^{177}\) to developers of “synthetic fuel projects.” These projects must be for the commercial production of synthetic fuel.\(^{178}\) The term “project” is broad and its definition is found at section \(112(18)(A)\). Four categories of structures are within the definition. First is the actual facility itself, from the massive amounts of concrete, gasifiers, and pressure vessels.\(^{179}\)

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173. Id. (emphasis added). The express provision made in § 175(b) exempting the Corporation from the environmental impact statement (EIS) requirement of NEPA creates two interesting questions. First, will EIS's be done at all? The answer is apparently yes; the Act does not remove the burden of other federal agencies to do EIS's on their actions concerning a project. For example, most plants will probably need a new source water pollution permit under Water Pollution Control Act, § 306, 33 U.S.C. § 1316 (1976). These permits are expressly made subject to the promulgation of an EIS by the Environmental Protection Agency in id. § 511, 33 U.S.C. § 1371. One problem, however, is that this § 306 permitting normally would occur later in the process and may not occur early enough for the EIS to have a significant impact in site selection. The question will depend to a certain degree on how quickly the Corporation becomes involved. Will it approve assistance prior to the acquisition of all necessary environmental permits—thus effectively limiting EIS review of the site—or will it require that an applicant procure all permits and complete all planning before approving assistance? Early experience under the interim program seems to show applicants coming to the Department of Energy for assistance very early in the planning process. The second question is the applicability of other subsections of NEPA such as National Environmental Policy Act of 1969, § 101(b), 42 U.S.C. § 4331(b) (1976) (“substantive NEPA”) and id. § 102(2)(E), 42 U.S.C. § 4332(2)(E) (“consideration of alternatives”). NEPA applies only to federal activities. Section 175(a) says the Corporation is not a federal agency. But if § 175(a) is the full answer to the question, what is the purpose of § 175(b)? Is the latter mere redundancy? In order to give all sections meaning, one might read § 175(b) to state implicitly that other non-§ 102(2)(C) NEPA duties remain in force.
177. Such assistance is defined as including loans, loan guarantees, price guarantees, purchase agreements, joint ventures and, in certain circumstances, purchase and lease-back agreements in id. § 112(7)(A), 42 U.S.C.A. § 8702(7)(A).
Second, the land on which the facility sits and the “mineral rights required directly for use in connection with the facilities” are eligible for assistance.\textsuperscript{180} Third, mining equipment and facilities are included in the definition.\textsuperscript{181} This assistance, however, is granted only when the mine is an integrated part of the project.\textsuperscript{182} Finally, necessary associated facilities such as pipelines, electric powerplants, electric transmission lines, and transportation facilities are eligible for assistance if they are for the exclusive use of the project and comprise a relatively small part of the project’s overall costs.\textsuperscript{183} Pipelines and other transport facilities that are used to carry synfuels away from the plant shall be for the exclusive use of the facility and shall terminate at a storage facility or pipeline interconnection in close proximity to the project.\textsuperscript{184}

While granting broad authority to the Corporation, Congress also attempted to retain control over the Corporation’s progress in meeting congressional objectives. To retain control, Congress created two phases in the Corporation’s life. The first phase started with enactment, June 30, 1980.\textsuperscript{185} The second phase is to start four years later, June 30, 1984.\textsuperscript{186} In the initial phase, funded by its initial capitalization, the Corporation is authorized to grant financial assistance “in such manner as will, in the judgment of the Board of Directors” include a technological diversity of processes as well as offer potential for achieving the production goal of the Act.\textsuperscript{187} This is a broad initial grant of authority to fund a multitude of diverse projects in order to ascertain those most suited for intensive development in the second phase.

The second phase is initiated by the promulgation of a “comprehensive strategy” and its approval by Congress. Six factors must be addressed by the strategy. First, it shall set forth the recommendations of the Board for achieving the goal and schedules for its achievement.\textsuperscript{188} Second, it shall emphasize private sector responsibilities.\textsuperscript{189}

\begin{itemize}
  \item \textsuperscript{180} Id. § 112(18)(A)(ii), 42 U.S.C.A. § 8702(18)(A)(ii).
  \item \textsuperscript{181} Id. § 112(18)(A)(iii), 42 U.S.C.A. § 8702(18)(A)(iii).
  \item \textsuperscript{182} Id. § 112(18)(A)(iii), (C)(iii), 42 U.S.C.A. § 8702(18)(A)(iii), (C)(iii).
  \item \textsuperscript{183} Id.
  \item \textsuperscript{184} Id. § 112(18)(A)(iv), (C)(iii), 42 U.S.C.A. § 8702(18)(A)(iv), (C)(iii).
  \item \textsuperscript{185} Id. § 113, 42 U.S.C.A. § 8701 note.
  \item \textsuperscript{186} Id. § 126(b)(2), 42 U.S.C.A. § 8722(b)(2).
  \item \textsuperscript{187} Id. § 126(a)(2)(A), 42 U.S.C.A. § 8722(a)(2)(A). The production goal of the Corporation is the energy equivalent of 500,000 barrels per day of crude oil by 1987 and at least 2,000,000 barrels per day by 1991. See id. § 125, 42 U.S.C.A. § 8721.
  \item \textsuperscript{188} Id. § 126(b)(3)(A), 42 U.S.C.A. § 8722(b)(3)(A).
  \item \textsuperscript{189} Id. § 126(b)(3)(B), 42 U.S.C.A. § 8722(b)(3)(B).
\end{itemize}
As a corollary to this emphasis, the strategy shall limit Corporation involvement in synfuels development and set dates for termination of that limited involvement. Fourth, it shall set forth an "investment strategy prospectus" which justifies the requested second appropriation. Fifth, it shall comprehensively evaluate and report on projects assisted during the first phase of the Corporation's activities. The report shall focus on the economic and technological feasibility of such projects and describe the environmental effects and water requirements found in such projects. Finally, it shall include recommendations, based on the above five factors, concerning the mix of technologies which the Corporation proposes to support with its second phase appropriations.

Following the submission of this strategy report, Congress shall, if it finds the strategy satisfactory, approve it by joint resolution. After this approval the Corporation may request phase two appropriations. Appropriation requests for phase two shall be limited to sixty-eight billion dollars: the two phases combined will provide the Corporation with eighty-eight billion dollars. The Board is authorized to modify the comprehensive strategy as it finds necessary to meet the production goals; significant alterations require congressional approval by a concurrent resolution of both houses. If the strategy is not developed within the allotted time, the Corporation is required to report the reasons for the delay and may request a one-year extension. Such an extension is deemed approved unless vetoed by either house.

A similar congressional intervention procedure exists in other limited circumstances. Under the Act, a "one-house veto" provision exists as to certain "Corporation synthetic fuel actions(s)." Interspersed throughout the Act is the requirement that the Corporation submit cer-

190. Id. § 126(b)(3)(C), 42 U.S.C.A. § 8722(b)(3)(C).
193. Id.
197. Id. § 126(c)(11), 42 U.S.C.A. § 8722(c)(11).
199. Id. § 129(a)(1), 42 U.S.C.A. § 8725(a)(1).
200. Id. § 126(d)(1), 42 U.S.C.A. § 8722(d)(1).
201. Id. § 126(d)(2), 42 U.S.C.A. § 8722(d)(2).
tain of its acts to Congress for possible veto. Three of these instances involve Corporation actions in response to cost overruns of assisted projects. If an overrun exceeds a certain percentage, further assistance to that project is not permitted if vetoed by Congress. The fourth "Corporation synthetic fuel action" concerns the Corporation's acquisition of assets of an assisted project which has failed financially or defaulted. In a situation occurring prior to approval of the comprehensive strategy, involving a project where substantial progress has occurred, and the failure of which would place greater financial liability upon the Corporation than would acquisition, the Corporation may desire to foreclose its security interest and complete the project as its own. Such foreclosure must be approved by the President and submitted for a possible one-house veto. The policy rationale for this latter congressional intervention is the desire to avoid Corporation ownership of or excessive entanglement with the private synfuels industry.

2. Solicitation for Proposals

Within six months after enactment, the Corporation is to make its initial solicitation for proposals. The solicitation shall be for construction or operation proposals and shall be published in the Federal Register. Prior to publication, such solicitations must be approved by the Advisory Committee. Solicitations shall contain general notice of the evaluative criteria in order to give proposers an opportunity to shape their proposals to best meet Corporation goals.

204. Two-hundred and fifty percent under id. §§ 132, 133, 42 U.S.C.A. §§ 8732, 8733 and 175% under id. § 141, 42 U.S.C.A. § 8741.
205. Id. § 137(b), 42 U.S.C.A. § 8737(b).
206. See supra notes 188-94.
208. Id. § 137(b)(4), 42 U.S.C.A. § 8737(b)(4).
209. Id. § 137(b)(5), 42 U.S.C.A. § 8737(b)(5).
210. Id. The same desire was previously seen in the third requirement of the comprehensive strategy. See supra text accompanying note 190.
212. Id. § 127(a)(1), 42 U.S.C.A. § 8723(a)(1).
213. Id.
The evaluative criteria are, of course, to be consistent with the corporate goal and comprehensive strategy.\textsuperscript{216} Priority is to be given to proposals from developers in states which have promised to limit red tape and expedite production.\textsuperscript{217}

3. Standards for Authorization of Assistance

Following receipt of proposals in response to its solicitations, the Corporation can grant financial assistance to the most responsive proposal.\textsuperscript{218} Preference shall be given to the project that requires the least commitment of financial assistance and promises the lowest unit production cost.\textsuperscript{219} Degrees of commitment are classified in the Act and price guarantees, purchase agreements, and loan guarantees are favored over direct loans or joint ventures.\textsuperscript{220} The Act further specifies four factors, designed to assure a technological base for later private development of the industry, that are to be considered in making awards. First, diversity of technologies is to be favored.\textsuperscript{221} Second, the potential cost per unit is to be examined.\textsuperscript{222} Third, the ability of the technology to conform with environmental and other regulatory standards is to be considered.\textsuperscript{223} Fourth, the overall production potential of the technology, including its ability to be copied, the extent of the raw material resource, its geographic distribution, and the potential uses of the end-product must be considered.\textsuperscript{224}

Because the assistance contracts are backed by the full faith and credit of the United States,\textsuperscript{225} Congress has granted the Corporation extensive powers to obtain information from potential grantees and to condition its assistance on many other relevant factors. First, the Corporation may demand such security as it deems necessary.\textsuperscript{226} Second, all contracts shall require the development of environmental monitoring systems.\textsuperscript{227} Third, all grantees must agree as a condition of assistance to provide any financial and other reports the Corporation deems

\textsuperscript{216} Id. § 127(d)(1), (2), 42 U.S.C.A. § 8723(d)(1), (2).
\textsuperscript{217} Id. § 127(f), 42 U.S.C.A. § 8723(f).
\textsuperscript{218} Id. § 131(a), 42 U.S.C.A. § 8731(a).
\textsuperscript{219} Id. § 131(b)(2)(A), 42 U.S.C.A. § 8731(b)(2)(A).
\textsuperscript{220} Id. § 131(b)(2)(B), (p), 42 U.S.C.A. § 8731(b)(2)(B), (p).
\textsuperscript{221} Id. § 131(b)(3)(A), 42 U.S.C.A. § 8731(b)(3)(A).
\textsuperscript{225} Id. § 131(b)(1)(C), 42 U.S.C.A. § 8731(b)(1)(C).
\textsuperscript{226} Id. § 131(c), 42 U.S.C.A. § 8731(c).
\textsuperscript{227} Id. § 131(c), 42 U.S.C.A. § 8731(c).
necessary; further, the Corporation can dictate to any grantee the manner in which its records are to be kept.\textsuperscript{228} The information gathering powers of the Corporation are limited only in that such information must be “for the purpose of insuring compliance with the terms and conditions” upon which assistance was granted.\textsuperscript{229}

Congress was also concerned with the effect of the Corporation’s activities upon normal entrepreneurial drives and market factors. This concern was manifested in a requirement that grantees bear a substantial risk of post-tax loss.\textsuperscript{230} Additionally, the Corporation may demand a share of the profits in loan or non-loan guarantee transactions.\textsuperscript{231} The Corporation can also demand that the use of loans and loan guarantees be monitored so as not to be intrusive on private capital markets.\textsuperscript{232} The Corporation is to assist or guarantee only those projects that cannot attract suitable private capital investments.\textsuperscript{233}

4. Forms of Financial Assistance

The Corporation has six devices through which it can meet its objective—loans, loan guarantees, purchase agreements, price guarantees, joint ventures, and Corporation owned projects. Congress has expressed preferences among methods and has placed certain restrictions on amounts and overruns, along with other guiding structures. The preferred methods of assistance are price guarantees, purchase agreements, and loan guarantees.\textsuperscript{234}

Price guarantees are to be set at a level, decided by the Board, that would foster incentives. Consistent with this theory, no “cost-plus” arrangements—those that virtually guarantee a profit—are allowed; prices must be certain and set at the time of the agreement.\textsuperscript{235} Corporate funds would be expended only if the market price were below this pre-established figure.

Purchase agreements are similar to price guarantees in that the Corporation neither supplies nor guarantees any of the capital invest-

\textsuperscript{228} \textit{Id.} § 131(i), 42 U.S.C.A. § 8731(i).

\textsuperscript{229} \textit{Id.}

\textsuperscript{230} \textit{Id.} § 131(g), 42 U.S.C.A. § 8731(g).

\textsuperscript{231} \textit{Id.} § 131(n), 42 U.S.C.A. § 8731(n).

\textsuperscript{232} \textit{Id.} § 131(r), 42 U.S.C.A. § 8731(r).

\textsuperscript{233} \textit{Id.}

\textsuperscript{234} \textit{Id.} § 131(p), 42 U.S.C.A. § 8731(p); see supra text accompanying notes 218-19.


\textsuperscript{236} \textit{Id.} § 134, 42 U.S.C.A. § 8734.
ment, but merely assures the developer of a market. The Corporation is allowed to sell any synfuel that it buys. The price of any purchase from a producer shall be set in advance, at the time of agreement.\textsuperscript{237}

Loan guarantees are the third preferred form of assistance. An applicant must show that it would be incapable of securing the necessary financing without the guarantee.\textsuperscript{238} Guarantees must not exceed seventy-five percent of estimated initial total cost of the project.\textsuperscript{239} Provision is made for some further guarantees in the event of cost overruns.\textsuperscript{240} Another interesting provision is a "non-default bailout" provision. If a borrower becomes unable to meet payments and yet is not in default, the Corporation is authorized to pay off the loan, or part of it, with the borrower then owing that amount, plus interest, to the Corporation,\textsuperscript{241} while retaining control and operation of his project.

Direct loans of investment capital are also available from the Corporation. There is a limit of "the lesser of 40 percent of the initial total estimated cost or not more than a minority financial position in the project."\textsuperscript{242} This limit can be increased to seventy-five percent for a particular proposal by affirmative action of the Board of Directors.\textsuperscript{243} Such action must be prefaced by a showing that the lower limit "would prevent the financial viability"\textsuperscript{244} of the project. Loans are also permitted to be made to cover a certain percentage of cost overruns up to 250%.\textsuperscript{245} If the overrun is over 250\% (in constant dollars),\textsuperscript{246} a congressional veto is possible.\textsuperscript{247}

Loans are interest-bearing and minimum rates are set by the Secretary of Treasury, considering average yields on other marketable obligations of the government.\textsuperscript{248} Loans may also be secured\textsuperscript{249} and a Corporation standard of "reasonable prospect" of repayment is set.\textsuperscript{250}

If a borrower is unable to meet payments, but is not in default, the

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\textsuperscript{237} Id. § 135, 42 U.S.C.A. § 8735.
\textsuperscript{238} Id. § 133(a)(4), 42 U.S.C.A. § 8733(a)(4).
\textsuperscript{239} Id. § 133(a)(2), 42 U.S.C.A. § 8733(a)(2).
\textsuperscript{240} Id. § 133(a)(3), 42 U.S.C.A. § 8733(a)(3). They are subject in some instances to one-house veto. See \textit{supra} note 203.
\textsuperscript{241} Energy Security Act, \textit{supra} note 2, § 133(b), 42 U.S.C.A. § 8733(b) (West Supp. 1980).
\textsuperscript{242} Id. § 132(a)(2)(B), 42 U.S.C.A. § 8732(a)(2)(B).
\textsuperscript{244} Id. § 132(a)(2)(B), 42 U.S.C.A. § 8732(a)(2)(B).
\textsuperscript{246} Id. § 132(a)(4), 42 U.S.C.A. § 8732(a)(4).
\textsuperscript{248} Id. § 132(b), 42 U.S.C.A. § 8732(b).
\textsuperscript{249} Id. § 131(b)(1)(C), 42 U.S.C.A. § 8731(b)(1)(C).
\textsuperscript{250} Id. § 132(b), 42 U.S.C.A. § 8732(b).
Board has authority to renegotiate the loan. This reflects congressional policy that it is in the “public interest” that the project continue.\textsuperscript{251} There is, however, a thirty-year limitation on loan terms.\textsuperscript{252}

In extreme circumstances, the Corporation itself is authorized to build, own, and operate a synthetic fuels project. First, the Corporation must have solicited proposals, awarded financial assistance, and negotiated contracts using the four means of assistance described above. It must also find that there are “insufficient acceptable proposals” to meet the objectives of the Act.\textsuperscript{253} The Corporation must then make an announcement in the Federal Register, describing its intent to construct a project and begin soliciting proposals.\textsuperscript{254} Finally, the Board of Directors must determine that current proposals, too, are insufficient to meet the objectives.\textsuperscript{255} At this point, the Corporation may solicit bids and make the necessary contracts.\textsuperscript{256}

Corporation-owned projects, so-called “Corporation construction projects,”\textsuperscript{257} may not be initiated after the approval of the comprehensive production strategy,\textsuperscript{258} and only three may exist prior to the time of approval.\textsuperscript{259} Thus, one would expect to see few Corporation construction projects in the future. Corporation-owned projects will be subject to local, state, and federal environmental, land use, and siting laws and must provide for monitoring of all emissions from the project, similar to private projects.\textsuperscript{260} Three years after the operation of a project, the project manager shall report on the success or failure of the project, its impact on workers and local communities, its environmental potential, and its effect on local and regional water supplies.\textsuperscript{261} Moreover, Corporation construction projects have been accorded the power of eminent domain when necessary to acquire access to the site for related purposes or to construct pipelines from the plant.\textsuperscript{262} Such power may not be used, however, to acquire the site itself.\textsuperscript{263}

\textsuperscript{251} Id. § 132(d), 42 U.S.C.A. § 8732(d).
\textsuperscript{252} Id. § 132(e), 42 U.S.C.A. § 8732(e).
\textsuperscript{253} Id. §§ 126(a)(1)(D), 141(a), 42 U.S.C.A. §§ 8722(a)(1)(D), 8741(a).
\textsuperscript{254} Id. §§ 126(a)(3), 141(a), 42 U.S.C.A. §§ 8722(a)(3), 8741(a).
\textsuperscript{255} Id. § 141(a), 42 U.S.C.A. § 8741(a).
\textsuperscript{256} Id. § 141(c), 42 U.S.C.A. § 8741(c). Solicitation of bids is made under id. § 127, 42 U.S.C.A. § 8732.
\textsuperscript{257} Id. § 141(a), 42 U.S.C.A. § 8741(a).
\textsuperscript{258} See supra notes 188-201.
\textsuperscript{259} Energy Security Act, supra note 2, § 142(a), (b), 42 U.S.C.A. § 8742(a), (b).
\textsuperscript{260} Id. § 143, 42 U.S.C.A. § 8743.
\textsuperscript{261} Id. § 144, 42 U.S.C.A. § 8744.
\textsuperscript{262} Id. § 171(c), 42 U.S.C.A. § 8771(c).
\textsuperscript{263} Id.
As a last form of assistance, the Corporation “shall require [any] recipient [of assistance] to provide for the fair and reasonable participation by small and disadvantaged businesses” in the project.\textsuperscript{264} Compliance with this requirement will most likely involve extensive Corporation review of recipient sub-contracting procedures.\textsuperscript{265}

One of the central features of the Act, reflected throughout its financial assistance preferences, is the preference to be accorded private capital. There is a strong desire not to have the Corporation become the capital financier of the industry. To that end, the directing of loans under the Act\textsuperscript{266} has been assigned a secondary role and a tertiary role has been assigned to Corporation construction projects.\textsuperscript{267} Additionally, there is an absolute preference expressed for price guarantees rather than capital-market interferences such as loans and loan guarantees.\textsuperscript{268}

5. Patent and Water Rights

This strategic preference for price guarantees is supported by the Act’s approach to the thorny question of patent rights. Projects assisted through price guarantees and purchase agreements shall have no Corporation interference with their patent rights.\textsuperscript{269} Projects assisted through loan guarantees or direct loans, however, “may require that whenever any invention is made or conceived in the course of or under such contract, title to the patent for such invention shall vest in the Corporation.”\textsuperscript{270} The Corporation shall have the right to license the patent on a non-exclusive basis\textsuperscript{271} and, indeed, shall assign exclusive patents only within a sharply confined decision-making structure requiring a finding of need for such exclusiveness in order to assure “substantial utilization.”\textsuperscript{272} These exclusive (or partially exclusive) patent assignments must be fully reviewed two years after the license has been granted.\textsuperscript{273}

\begin{itemize}
\item \textsuperscript{264} \textit{Id.} \textsuperscript{264} § 174, 42 U.S.C.A. § 8774.
\item \textsuperscript{265} \textit{Id.} \textsuperscript{265} § 131(i), 42 U.S.C.A. § 8731(i). For the information gathering authorities of the Corporation see \textit{supra} notes 227-28 and accompanying text.
\item \textsuperscript{267} \textit{Id.} \textsuperscript{267} § 131(b)(2)(B)(iii), 42 U.S.C.A. § 8731(b)(2)(B)(iii).
\item \textsuperscript{268} \textit{Id.} \textsuperscript{268} § 141(a), 42 U.S.C.A. § 8741(a); \textit{see supra} notes 253-57 and accompanying text.
\item \textsuperscript{269} \textit{Energy Security Act, supra} note 2, § 173(a), 42 U.S.C.A. § 8773(a) (West Supp. 1980).
\item \textsuperscript{270} \textit{Id.}
\item \textsuperscript{271} \textit{Id.}
\item \textsuperscript{272} \textit{Id.} § 173(b)(2), 42 U.S.C.A. § 8773(b)(2).
\item \textsuperscript{273} \textit{Id.} § 173(c), 42 U.S.C.A. § 8773(c).
\end{itemize}
loan guarantees is a provision that all patents developed at a project shall vest in the Corporation upon default by the recipient.\(^{274}\)

There are also no advantages conferred by Congress in competing for water rights in the arid West. No project is considered “federal” for the purpose of exercising the federal government’s water rights.\(^{275}\) Projects are, again, expected to be based on private economic, geographical, and environmental realities.

Given the background of the Corporation, its decision-making structure, and activities, what environmental problems will synfuels development raise? We first briefly review the technology of synfuels.

### III. The Technology of Synfuels

Section 112(17)(A) of the Act defines “synthetic fuel” as “any solid, liquid, or gas, or combination thereof, which can be used as a substitute for petroleum or natural gas . . . produced by chemical or physical transformation.”\(^{276}\) To fall within this definition, the fuel must be from domestic sources of a coal, including lignite and peat, shale, tar sands or water, as a source of hydrogen only through hydrolysis.\(^{277}\) The Act, however, specifically excludes any fuels derived from biomass.\(^{278}\) This omits fuels derived from biomass from the mandate of the Corporation, promoting them, instead, through the Department of Energy.\(^{279}\)

Several types of technology are envisioned as being within the developmental mandate of the Corporation. Each of these types of technology, though sharing certain scientific principles, is completely different and is designed to fit the differing raw source materials and the desired product.\(^{280}\) “[T]wo major differences have a profound influence on the respective technologies: hydrogen content and mineral content.”\(^{281}\)

Hydrogen and carbon are the building blocks of organic chemicals and fossil fuels, hence the term “hydrocarbons.” The higher the ratio

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274. *Id.* § 173(d), 42 U.S.C.A. § 8773(d).
277. *Id.*
278. *Id.* § 112(17)(C), 42 U.S.C.A. § 8702(17)(C).
281. *Id.*
of hydrogen to carbon, the higher the energy value of the source. Methane (natural gas) has a hydrogen to carbon ratio of 4:1 while coal has a ratio of between 3:1 and 2:1. The ratio of shale is between these at approximately 2:2. The common objective in synthetic fuels production is to hydrogenate the source fuel and thus increase its energy value. Hydrogenation is both expensive and difficult, for the procedure requires great heat, pressure, and technical control. "The lower the hydrogen content of the raw material, the higher the cost is likely to be of the final synfuels product."282 Mineral content is important because it is a retardant which must be stripped away before the organic raw materials can be recovered.283

A. Oil Shale

Oil shale is not literally shale but marl, a crumbly limestone. Marl contains kerogen, a hydrocarbon that was never subjected to the forces of nature that created oil.284 As such, man desires to complete the task. Two methods of performing the task exist, both variations on the process of retorting.

1. Surface Retorting

Surface retorting begins with the mining of shale. While the figures range from fifteen to forty gallons of oil per ton, depending on shale quality, most experts work on the basis of about thirty gallons per ton with a ninety percent recovery rate for the major fields of the Green River formation of Colorado.285 A commercial plant of 50,000 barrels per day would require 75,000 tons of shale daily at fifty tons per minute.286 Mining is to be done by an open-pit ("strip-mining") method. Because of lesser density, the amount of waste material fills a greater volume than the raw material.287

The shale is retorted in huge surface "ovens" at about 900° F, producing oil itself, which is ready, after conditioning, for the refinery. It

282. Id.
283. For a discussion of the environmental problems this creates, especially regarding shale, see infra text accompanying notes 399-452.
286. CHEM. & ENGINEERING NEWS, supra note 285.
287. Id.; see also Salisbury, supra note 285; Schuyten, supra note 285.
can be used as a boiler fuel without conditioning.\textsuperscript{288} The process also uses approximately three to five barrels of water for each barrel of oil produced, a significant factor in arid western Colorado.\textsuperscript{289}

2. In situ Retorting

The second major oil shale retort process is known as “in situ,” or in its presently more developed form, “modified in situ.” It is the special preserve of Occidental Petroleum and its leader, Dr. Armand Hammer.

While the process addresses the two most serious concerns raised by the surface retorting process—waste volume and water usage—it may create problems of its own. Its technological feasibility is, at this time, less assured than that of the surface retort, but its future appears sound.\textsuperscript{290} Occidental has spent over $100 million since 1972 in its drive to create the in situ technology.\textsuperscript{291} The technology, as modified, involves removing only the top twenty percent or so of the surface shale. Large areas, approximately 4000 square yards, and 250 feet deep, are then developed. Holes are drilled to this depth and explosives inserted. The shale is then fractured and slow burning fires are started at the top. As the fire burns down, the oil gathers in pools at the bottom where it is pumped out. About forty such areas in simultaneous production are necessary to create 50,000 barrels of daily commercial capacity.\textsuperscript{292} The obvious benefit is the avoidance of large-scale mining and the tremendous volumes of waste products. Occidental claims that water usage is about one barrel of water for each barrel of oil produced, a significant improvement over the surface retorting method.\textsuperscript{293} Technological problems may exist in failing to fracture the shale into uniform blocks,\textsuperscript{294} and in using shale that is too rich\textsuperscript{295} although Occidental denies the existence of either problem.\textsuperscript{296} Dr. Hammer believes the process is also several times more efficient, since it uses more of the shale resource.\textsuperscript{297} The hidden environmental problem may be the pollution

\textsuperscript{288} Schuyten, supra note 285.
\textsuperscript{289} See supra note 285.
\textsuperscript{290} SUBCOMM. ON SYNTHETIC FUELS OF THE SENATE COMM. ON THE BUDGET, supra note 280, at 167.
\textsuperscript{291} Sansweet, supra note 284, at 26.
\textsuperscript{292} Id.
\textsuperscript{293} Id.
\textsuperscript{294} Bus. Wk., Apr. 23, 1979, at 126.
\textsuperscript{295} Id.
\textsuperscript{296} Id.
\textsuperscript{297} Id.
of ground-water.298

B. Coal Gasification

1. Surface Technologies

The gasification of coal is a well developed technology.299 It is also the intermediate process in the liquefaction of coal through indirect technologies and, thus its technical development aids in liquefaction technologies.300

Again, the technological goal is to increase the hydrogen to carbon ratio of coal. The first step is to pulverize the coal. Pulverized coal is then heated under high temperatures and pressure and mixed with steam and oxygen. This “opens” the chemical structure of the coal and admits the hydrogen found in the steam to create a gaseous mixture of hydrogen and carbon monoxide.301 In itself, this mixture is suitable for use as a boiler fuel. When passed over a nickel-based catalyst, methane (natural gas), a high-Btu302 gas suitable as a pipeline product results.303 Earlier technologies have a limiting factor, however, in that they are not useful for the gasification of harder Eastern coals which tend to cake, and thus foul the equipment, at the pressures used.304 Currently, the most advanced United States project is that of the American Natural Resources Company in Beulah, North Dakota, known as the Northern Great Plains Coal Gasification Project.

More advanced technologies capable of producing high-Btu gas from Eastern coal are under development and testing, by Conoco, among others. Using a “slagging gasifier,” developed by British Gas and the Lurgi Company, the objectionable compounds are removed from the process.305

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298. Sansweet, supra note 284, at 26; see also infra notes 433-54.
299. Subcomm. on Synthetic Fuels of the Senate Comm. on the Budget, supra note 280, at 166.
300. An exception to this is “direct” liquefaction technologies which are under development. See infra note 322.
301. Schuyten, supra note 285.
302. A Btu (British thermal unit) is the amount of heat needed to increase the temperature of one pound of water by one degree Fahrenheit at or near 39.2° F. Webster’s New Collegiate Dictionary 139 (5th ed. 1977).
303. Schuyten, supra note 285.
304. Id.
2. In situ Coal Gasification

Much American coal cannot be economically mined. For several years, therefore, the Department of Energy and its predecessor, the Energy Research and Development Administration, have been conducting research and development in Hanna, Wyoming, on the prospects of gasification below the surface in a method analogous to the in situ technologies being developed in the oil shale fields. While the technology is several years from commercial feasibility it leaves hope for several promising developments.

The process currently only works with lignite and sub-bituminous, which are coals found in the West.\textsuperscript{306} The process involves drilling two deep holes and forcing air down one hole while igniting the other.\textsuperscript{307} The slow-burning fire moves toward the air source which is permeating the coal and creates an opening. Gasification begins at this point. The fire then burns toward the top of the seam and moves back toward the ignition hole. A third hole, to the other side of the ignition hole, is then drilled and air is injected into this third hole, restarting the process.\textsuperscript{308}

The product is, as in surface gasification, a low-Btu gas. This is because air is composed of approximately four-fifths nitrogen, a non-combustible material. To increase the Btu content, pure oxygen could be used in place of air but this would create explosive potentialities.\textsuperscript{309}

The advantages of such a process are the increased amounts of usable coal and reduced waste-ash disposal problems.\textsuperscript{310} Additionally, the process recovers about the same amount of energy from the coal as conventional utility-burning. The possible disadvantages, include subsidence of the ground and possible ground-water contamination.\textsuperscript{311}

C. Coal Liquefaction

1. Indirect Procedures

The indirect coal liquefaction procedures all borrow heavily from the coal gasification technology\textsuperscript{312} because gasification is the intermedi-
ate process in indirect liquefaction. In the basic Lurgi gasification process, pulverized coal, under high temperature (1800°F)\textsuperscript{313} and pressure, is mixed with steam and oxygen to create a gaseous mixture of hydrogen and carbon monoxide. At this point the mixture can either be converted to synthetic natural gas or to liquid fuels.\textsuperscript{314} The latter product would use the indirect liquefaction process that is the topic of this section.

The only commercial synfuel plant in the world, Sasol of South Africa, is of this nature. It completes the transformation from gas to liquid fuel (it chooses to produce gasoline) via the Fischer-Tropsch process. This latter step involves passing the gas over a solvent or catalyst to create the liquid fuel.\textsuperscript{315} The Fischer-Tropsch process is of low efficiency when gasoline is the desired product because much of the gaseous by-product is wasted in South Africa and its output is oxygenated.\textsuperscript{316} While these products could be used, most experts advocate either direct liquefaction process\textsuperscript{317} or another indirect process that uses a technology developed by Mobil known as the "m-gasoline" process.\textsuperscript{318} In this process crude methanol (the liquid alcohol version of methane) vapors produced from the purified gaseous mixture are passed over a synthetic zeolite catalyst.\textsuperscript{319} The methanol rearranges itself to produce several hydrocarbon products including gasoline, liquified petroleum gas, and fuel gas.\textsuperscript{320} These products contain ninety-five percent of the energy found in the source methanol and the gasoline is from ninety-four to ninety-seven octane.

2. Direct Liquefaction

Currently, around twenty-five coal liquefaction techniques in various stages of development exist in the United States.\textsuperscript{321} While several of these are indirect processes the preferred technique is the direct liq-

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\textsuperscript{314} Subcomm. on Synthetic Fuels of the Senate Comm. on the Budget, *supra* note 280, at 166.


\textsuperscript{317} See infra notes 321-23.


\textsuperscript{320} Id.

uefaction of coal which allows the elimination of the intermediate gasification process.\textsuperscript{322} Generally, this process involves the dissolving of coal under temperature and pressure with a coal-derived solvent and a catalyst that chemically transfers hydrogen to the coal to form a refinable liquid fuel.\textsuperscript{323}

IV. ENVIRONMENTAL CONSTRAINTS

A. General Overview

All involved in the development of national synthetic fuels policy concede that important environmental questions abound and that the answers to these questions, if any, are, in most cases, both speculative and untested. The debate is serious and its resolution will be a prerequisite to a successful synthetic fuels program.\textsuperscript{324}

1. The Political Setting

Remarking about synthetic fuels plants, an official of the Department of Energy noted "[t]hese are not nice plants. These are big, dirty plants. Everybody wants these plants but wants them someplace else."\textsuperscript{325} To the environmental community they are an anathema, "disasterous and irreparable,"\textsuperscript{326} and a "tragic error."\textsuperscript{327} They create the

\begin{itemize}
  \item \textsuperscript{322} Schuyten, \textit{supra} note 285.
  \item \textsuperscript{323} \textit{Id.} Three procedures, in particular, are relatively advanced, the H-coal process designed by Dynatectron (and being implemented at Catlettsburg, Ky.), the Exxon Corporation's EDS (Exxon Donor Solvent) process (being implemented in Baytown, Tex.), and the Gulf Oil Corporation's SRC-II (Solvent-Refined Coal, second generation) process (already in operation at Tacoma, Wash., and being planned for Morgantown, W. Va.). Knight, \textit{A Liquefaction Plant Symbolizes Problems}, Wash. Post, July 29, 1979, at F1, F6. All of these processes produce industrial boiler fuel to replace oil in power plants and are the least expensive of the current liquefaction technologies. \textit{Id.} The difference between the processes focuses on the solvent used and the source of the hydrogen. The solvents, of course, are patented. The SRC-II plant being planned in West Virginia will run on Eastern coal, Yemma, \textit{Synfuels}, Christian Sci. Monitor, May 27, 1980, at 1, col. 1, and possibly Texas lignite, Van Slambrouck, \textit{Synfuel Pilot Projects Sprout, But Technology Risks High}, Christian Sci. Monitor, Feb. 29, 1980, at 1, col. 1.
  \item \textsuperscript{324} See National Energy Security Corporation: \textit{Hearings on H.R. 5045 Before the Subcomm. on Energy and Power of the House Comm. on Interstate and Foreign Commerce, 96th Cong., 1st Sess. 287 (1979) (statement of J. Gus Speth, Chairman, CEQ) [hereinafter cited as \textit{Hearings on H.R. 5045}]. "I think it is fair to say that the anticipated environmental impacts of synthetic fuel development will be significant. There are major uncertainties associated with the exact scope of those impacts." \textit{Id.}
  \item \textsuperscript{325} Jaroslovsky & Farney, \textit{Synthetic-Fuel Plans Stir Doubts on Costs, Environmental Impact}, Wall. St. J., July 12, 1979, at 1, col. 6 (quoting Robert Hanfling).
  \item \textsuperscript{326} Shabecoff, \textit{Environmentalists Fear a Retrenching by Carter}, N.Y. Times, July 17, 1979, at D12, col. 2.
  \item \textsuperscript{327} Sinclair, \textit{5 Major Environmental Groups Urge Cheaper Synthetic Fuel Alternatives}, Wash. Post, July 13, 1979, at A13, col. 1 (quoting Jonathan Nash of NRDC).\
\end{itemize}
potential for "little Pittsburgs in the middle of Montana."\textsuperscript{328}

Conflict between those who would develop energy sources said to be necessary for American security and those who prefer preservation of a pristine environment is inevitable. To assure credibility and political legitimacy of the program,\textsuperscript{329} it is important that substantial consideration be given to the conflict resolution process, as well as its outcome. Many consider that insensitivity to legitimate public concerns and a subsequent loss of credibility played an overriding role in the apparent defeat of nuclear power. The same fate has been suggested for synfuels development.\textsuperscript{330} These fears were reflected by Senator William Armstrong of Colorado in his statement that "a crash program haunts Coloradoans afraid the federal government will bulldoze through a program that screws up our environment."\textsuperscript{331} This statement is important for yet another more subtle reason. It implicitly recognizes one of the key political environmental realities of the synfuels debate—that it is essentially Western lands, Western air, Western coal, and Western water that will be utilized for synthetic fuels and that the states bearing the heaviest burden of environmental and social costs will not be the ones reaping the largest proportion of the gains.

Conversion of coal into synfuels:

redistributes the environmental impacts of coal use. Much of the solid waste and many of the pollutants in coal are removed in the conversion process. Waste is thus transferred from the largely urban areas that consume energy to the rural areas where coal is mined and synthetic fuels are likely to be produced.\textsuperscript{332}

Shale, as well as the largest amounts of readily and economically mineable coal, are found only in the West. Exploitation of these resources involves costs and burdens on the Western environment.

2. Overview of Environmental Concerns

Essentially six broad categories of environmental concerns cross the entire synfuels spectrum from shale to coal liquefaction. First,
SYNTHETIC FUELS

Synfuels development will significantly affect air quality, especially in the West where most of the ambient air quality standards have already been met. Under the Clean Air Act, national ambient air quality standards, and thus corresponding emission limitations, exist for six pollutants—sulfur dioxide, carbon monoxide, photo-chemical oxidants, nitrogen oxides, total suspended particulates (TSP), and lead. Because the ambient standards have been met, the Western region is in what is known as a “preservation of significant deterioration” (PSD) mode. PSD status confers upon an area the most stringent protections under the Act and requires prospective developers go through a rigorous preconstruction review to obtain a permit from the Environmental Protection Agency. This review is designed to assure that the potential emissions from the source are not of such a magnitude as to cause the area to violate the national ambient air quality standards. Additionally, Class I areas, generally national parks and other environmentally significant federal lands in the West, are protected from any impacts by industrial plants, including those located outside the area. Neither visibility regulations nor some of the more significant standards for the PSD program, however, are in effect. The PSD program operates through use of an “increment,” which is essentially a government sponsored quantitative “pollution right” granted after rigorous review. The size of the increment depends, among other

333. “Ambient” standards are those which measure overall quality of air in a region.
335. The national ambient air quality standards (NAAQS) are set by the Federal Environmental Protection Agency. The emission limitations are set for each source of air pollution by individual states in its state implementation plan (SIP). *See id. §§ 7409-7410.*
336. These are known as “criteria pollutants.” *See 40 C.F.R. Part 50 (1981).*
338. *See supra notes 335, 337.*
339. In general, obtaining a PSD permit involves ambient air quality monitoring for one year prior to application, combined with mathematical modeling to predict the effects of the plant on the ambient quality. Approval of the permit is conditioned upon, among other factors, a prior public hearing, a demonstration that the plant will meet and stay within its increment and that it is not in violation of the NAAQS, the standard of performance or the toxics limitations. The plant must also show that it is using the best available control technology, it is protecting visibility and does not interfere with the maintenance of NAAQS in any area. In addition, the plant must be approved by the Federal Land Manager, at the Department of the Interior, if it will impact on a Class I area. *See 42 U.S.C. §§ 7470-7491, 7407(d)(1)(E), 7409-7412 (Supp. I 1977).*
340. *See id. § 7475(a)(3)(B).*
341. *See id. § 7491.*
342. Visibility regulations are authorized under id. § 7491(a)(4).
343. An “increment” is a portion of the amount of pollution that could be added to presently clean air without degrading the air to a point where the NAAQS are no longer met. *See id. § 7473.*
344. *See id. § 7473(c)(3).*
things, on the current ambient air quality levels, the type of area to be polluted and the type of pollutants to be emitted. Additionally, synthetic fuels plants will be required to meet new source "standards of performance" technology-based controls that require the application of the "best system of continuous emission reduction which . . . has been adequately demonstrated for that category of sources." These standards have not yet been promulgated.

Each of these programs is further implemented through pollutant-specific, individual source emission limitations within each state's implementation plan. A last problem is that of "fugitive" emissions, those that enter the atmosphere without first passing through a stack; an example would be the large amounts of total suspended particulates (TSP), given off in surface mining operations. The regulatory problems here are similar to those for non-point sources, those not emitted through a pipe, in the water areas. Regulation by the Environmental Protection Agency is limited to a policy statement on how they should be treated within state implementation plans designed to achieve overall ambient standards.

Second, there are serious but unresolved questions about the effects of synfuels development on water quality. While most synfuel processes are designed to have a zero-emission base from point sources due to the use of closed-recycling systems, the more serious questions surround non-point source effluents that are far more difficult to control through technological systems. The non-point sources in-

345. See id. § 7410(a)(2)(D).
346. See id. §§ 7473, 7491. The standards to protect visibility are quite stringent even to the extent of requiring the best available retrofit technology to control omissions. Id. § 7491(b)(2)(A).
347. Increments for pollutants other than sulfur oxide and particulate matter have not been set. See id. § 7473.
348. Id. § 7411(a)(1)(A)-(C).
349. See id. § 7410(a)(2)(D).
350. See Note, supra note 332, at 400 n.85.
351. See infra note 362 and accompanying text.
clude the leaching of waste disposal areas\(^{355}\) and, in the in situ shale oil processes, the leaching of spent underground retorts by ground-water movement.\(^{356}\) The latter questions are especially serious.

Point source emissions are controlled under the Clean Water Act.\(^{357}\) Both specific effluent standards, set by the Environmental Protection Agency on an industry-wide basis,\(^{358}\) and technology-based control systems are mandated.\(^{359}\) The latter require the application of the "best available demonstrated control technology;"\(^{360}\) and both are enforced through a federal permit system known as the National Pollutant Discharge Elimination System.\(^{361}\)

Non-point sources, however, present significant technological and regulatory problems\(^{362}\) because there is no discrete source to monitor or treat. Subject to far less stringent controls,\(^{363}\) they are generally limited to the requirement to create an "area-wide management plan" designed to maintain ambient quality standards.\(^{364}\) The non-point source pollution problem is intimately related to a third set of environmental problems, the control of carcinogenic, mutagenic\(^{365}\) and teratogenic\(^{366}\) pollutants. These toxins are found at most stages of the synfuels process—during chemical transformation of the source material,\(^{367}\) in its waste products,\(^{368}\) as well as in the final product.\(^{369}\)

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\(^{355}\) Office of Tech. Assessment, supra note 353, at 293; SRC-II, supra note 353, at 4-22; Great Plains Gas, supra note 353, at 1-57.

\(^{356}\) See id.


\(^{358}\) Id. §§ 1311, 1314, 1342.

\(^{359}\) Id. §§ 1311, 1342.

\(^{360}\) Id. § 1316 (1976). This section applied to all new sources and applies a somewhat stricter standard than for existing sources.

\(^{361}\) Id. § 1342 (1976 & Supp. III 1979).

\(^{362}\) See Office of Tech. Assessment, supra note 353, at 294, 298, 302-08; see also Note, supra note 352, at 397 n.55.


\(^{364}\) Id. § 1288(a)(2). This section provides that a local organization shall be appointed by the Governor of a state to create a plan to bring a state into compliance with the ambient standards. Section 1288(b)(2) requires that the plan consider various non-point sources and in the case of "construction activity related sources," there must be, under § 1288(b)(2)(H), set forth procedures and methods (including land use requirements) "to control to the extent feasible such sources." Section 1288(b)(2)(K) requires that the plan shall include "a process to control the disposal of pollutants on land or in subsurface excavations within such area to protect ground and surface water quality."


\(^{367}\) Office of Tech. Assessment, supra note 353, at 296; SRC-II, supra note 353, at 4-3; Great Plains Gas, supra note 353, at 1-41.
Scientific knowledge about the types of pollutants, their concentrations, or their effects is not well developed.

The essential chemical fact of synfuels production is incomplete oxidation, or burning, of the source material. The aim is to shorten the long organic carbon chains, making the hydrogen to carbon ratio higher, by placing hydrogen atoms at points where carbon atoms formerly joined each other. In breaking the original carbon chain, short chains as well as longer chains and rings are formed. The longer chemical structures are the bases for such complex organic toxics as phenols, benzene, polynuclear aromatic compounds, and heterocyclic sulfur compounds. Most are carcinogenic and all are found in one or the other of the basic coal or shale processes. Dangers are thus created for employees who may come into contact with both the process materials and the final unrefined products. These problems may be mitigated through stringent occupational safety and health measures.

Waste, however, creates the most serious problem, both because of its sheer volume and the inability of occupational hygiene methods to deal with it. Waste can come both from unconsumed source materials and from materials captured by various pollution control devices. When disposed of above ground, waste can be leached by rain waters. Waste disposed of in the original mine, pit, or canyon, can leach by ground-water. Ground-water leaching is the most serious environmental obstacle to the commercial development of in situ shale retorting. Scientific knowledge of the effect of leaching or of the components of leachates is incomplete and the danger of pollution of ground-waters and thus public drinking water supplies is significant.

Toxic substances are controlled in various ways under several stat-
utes at the federal level. Generally, the Environmental Protection Agency finds a substance to be hazardous after an informal rulemaking procedure and then promulgates regulations circumscribing the substance’s generation, transportation, and disposal. Some of the synfuels substances or wastes are likely to be so regulated in this manner. No technology or control method has yet been developed, however, that can ensure that subsurface leachates will not reach groundwater.

The waste disposal problem points up a fourth broad class of environmental problems: those associated with land use, mining, and the reclamation of mined lands. Even if plants are built and waste is disposed of in accordance with the pertinent regulations, the terrain will be changed and wildlife disrupted, its habitat and forage destroyed. The enormous amounts of raw source materials, whether coal or shale, that will be used, make it likely that plants will locate adjacent to mines created for or devoted primarily to plant use. Serious problems are the mining and the subsequent waste disposal and land reclamation, especially in the water-short West. Reclamation of this land is exceedingly difficult and the coal industry “has yet to prove that it can fully reclaim the western lands strip-mined to produce coal.”

It is questionable whether reclamation is possible in arid desert regions. Land reclamation is also very expensive, averaging anywhere from $200 to $18,000 per acre, depending on the soil conditions, water supplies, and other environmental conditions.

Coal mining is regulated under the detailed standards of the Surface Mining Control and Reclamation Act. While shale mining is

381. About 500 square miles of land would be strip-mined over the lifetime of each coal plant (30 years) and approximately 200 square miles would be strip-mined over the lifetime of each shale plant. If Eastern coal were used, between 300 and 1000 square miles per plant-lifetime would be necessary. Hearings on H.R. 5045, supra note 324, at 292 (statement of J. Gus Speth, Chairman, CEQ).
382. See SRC-II, supra note 353, at 2-12; GREAT PLAINS GAS, supra note 353, at 1-30, 1-58.
384. Id.
currently not regulated by the federal government except on federal lands under a general “avoid, minimize or repair” standard, it is regulated under state laws, which need strengthening.

A fifth environmental problem is scarce water supply. This problem imposes physical constraint on the size of any potential synfuels industry. In shale projects, especially, it is an actual limitation on the potential growth of the industry. Water is used to provide hydrogen and to cool the processes. Depending on the process, between two and five barrels of water for each barrel of synfuel product are necessary in shale processes.

A last possible environmental problem is potentially the most serious, though it has only been recently recognized and its scientific basis is still challenged. This problem is the “greenhouse effect” or the effect that sharply increased fossil fuel use can have on rising carbon dioxide (CO$_2$) levels. It is feared that such conditions would effect the world’s climate. A report prepared for the Council on Environmental Quality (CEQ), warns that the amount of CO$_2$ is increasing at around four percent per year. The possibility of a doubling of the world’s level by 2030, is “believed by many scientists to pose perhaps the most serious environmental risks of anything we are doing today to alter the face of the planet.” The results could be droughts in some areas, and the displacement or shifting of agricultural areas. Also, the warmer climate of the Earth may cause the Antarctic ice caps to melt and result in the serious flooding of coastal areas. Synthetic fuels would accelerate this trend because CO$_2$ is produced both when


386. 30 C.F.R. § 231.4(b) (1981).


388. OFFICE OF TECH. ASSESSMENT, supra note 353, at 359-60.

389. See supra notes 337-44 and accompanying text.

390. See OFFICE OF TECH. ASSESSMENT, supra note 353, at 362-63.

391. Note, supra note 332, at 400-01.


396. Omang, supra note 392.
SYNTHETIC FUELS

synfuels are created and burned. The report to the CEQ estimated that synthetic fuels (in general) put out 1.4 times as much CO$_2$ as coal, 1.7 times as much as oil, and 2.3 times as much as natural gas. The following sections address each type of fuel more closely, focusing only on the more serious of its environmental hazards.

B. Oil Shale

Both criteria and non-criteria air pollutants will be emitted in substantial quantities by both shale mining and retorting. The mining emissions are generally fugitive, while the retorting emissions are controllable as stationary sources. Stationary source emissions, however, are expected to be controllable within the requirements of the Clean Air Act with proper application of the best available technology. Fugitive emissions are less controllable through these means and, thus, present serious difficulties for surface retorting mining processes, in PSD situations. Certain synthetic fuels backers have argued that the Clean Air Act should either be amended or that the method of measuring ambient levels be adjusted to exclude fugitive emissions.

As outlined below, however, water quality and quantity presents the most serious barrier to large scale shale oil exploitation. Related to the water quality problem is that of waste disposal and land reclamation. Shale oil production requires from two to five barrels of water for each barrel of product. The lower end of the range represents the figures for Occidental's in situ program while the higher figures apply to surface programs such as the Colony project of TOSCO and Exxon. In the arid areas of Colorado and Utah questions are raised about the size of the industry that can be supported with current available resources.

Colorado's Department of Natural Resources estimates that

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397. Id.
398. Id.
399. See Office of Tech. Assessment, supra note 353, at 260; SRC-II, supra note 353, at 4-33, C-5.
402. See Office of Tech. Assessment, supra note 353, at 260-61. Fugitive emissions are a far less severe problem in in situ processes because 80% less shale is mined.
405. Id. For an examination of the reasons for this difference, see infra notes 415-20.
enough unused water exists to supply to shale industry producing 500,000 barrels of product per day and still permit adequate development of agriculture.\textsuperscript{406} The Office of Technology Assessment agrees, but qualifies its agreement by noting that fulfillment of this prediction requires that additional reservoirs and pipelines be built, that no decrease in the average virgin flows of the Colorado River occur, and that increases in other demand be within predicted levels.\textsuperscript{407} Even with these conditions and without shale development, the study notes that the surface water surplus will disappear between the years 2007 and 2027, depending on the region’s growth rate.\textsuperscript{408}

The most significant factor limiting synfuels development is the availability of surface water. If production is to exceed 500,000 barrels per day,\textsuperscript{409} it will probably be necessary either to exploit ground-water supplies or to import water from other hydrologic basins.\textsuperscript{410} The surface retorting processes which use larger quantities of water, are expected to be located in the drier areas along the southern fringe of the Piceance Basin, thus limiting the feasibility of tapping ground-water supplies.\textsuperscript{411} By contrast, the in situ processes are expected to be located near areas where ground-water supplies are plentiful.\textsuperscript{412} This result is unfortunate for two reasons. First, in situ processes require little water\textsuperscript{413} and, second, the problem of leaching of spent underground retorts, present in in situ processes, is caused by ground-water.\textsuperscript{414} Environmental and technical considerations account for the differences in the amount of water required by the surface retort and in situ processes. First, as previously noted,\textsuperscript{415} greater quantities of fugitive dust are created by the surface mining done in conjunction with the surface retort procedures. The usual method of controlling this prob-

\begin{itemize}
\item \textsuperscript{406} Sansweet, supra note 284, at 26, col. 5.
\item \textsuperscript{407} Office of Tech. Assessment, supra note 353, at 359. See generally id. at 380-95 (discussion of water availability and acquisition methods).
\item \textsuperscript{408} Id.
\item \textsuperscript{409} In a uniquely bullish forecast, based on at best a dubious projection, Exxon has called for an eight million barrel per day program of shale oil production in the Piceance and Uinta Basins of Colorado and Utah. They urge that additional water be “transported” into the region and suggest that it is “physically feasible” to divert the Missouri River for this purpose. Further study of this proposal would appear to be necessary. Exxon, The Role of Synthetic Fuels in the United States Energy Future 10 (1980).
\item \textsuperscript{410} Office of Tech. Assessment, supra note 353, at 360.
\item \textsuperscript{411} Id. at 363.
\item \textsuperscript{412} Id.
\item \textsuperscript{413} See supra text accompanying note 405; infra text accompanying notes 415-20.
\item \textsuperscript{414} Office of Tech. Assessment, supra note 353, at 294; see infra note 424.
\item \textsuperscript{415} See supra note 402.
\end{itemize}
lem involves spraying water on the dust. Moreover, climatic conditions dictate that if barren land is to be reclaimed after the removal of shale, large amounts of water will be required for revegetation and the prevention of wind erosion. In situ processes raise neither of these problems because eighty percent of the shale is retorted underground, without mining.

Second, surface retorting uses significant amounts of water to cool the solid-fuel steam cycle systems used for power generation at the retort. The water for cooling is unnecessary in the in situ procedure because power will probably be generated by burning low-Btu gas in open-cycle turbines which do not require cooling systems.

As noted above, the in situ processes offer significant environmental benefits in three areas, lower fugitive air emissions, easier waste disposal and land reclamation, and less water requirements for mining, retorting, and waste disposal. It is, however, definitely not a benign technology, for there are serious environmental hazards in an area about which little is known. The prevention and amelioration of ground-water pollution are formidable problems regulated by underdeveloped law.

The regulatory framework of water pollution control has focused on controlling effluent emissions from point sources. The control of non-point sources was considered less serious and less capable of being regulated. Given this framework, shale oil project plans have extensively developed point source control programs and most will operate on a zero-emission basis. This is not to say that the processes create no liquid pollutants. It is expected that the process will create hydrogen sulfide (H₂S), ammonia (NH₃), dissolved organics, trace elements, and possibly some toxic metals. Additionally, all pollution devices using dust scrubbers and water sprays will contain suspended solids,
dissolved inorganic salts, phenols, and organic acids and amines. This waste water, however, will be treated for reuse within the facility and untreated wastes will be sent to spent shale piles. Spent shale itself also contains sulfates, carbonates, bicarbonate, and other inorganic ions. These are alkaline and have pH's ranging to thirteen.

As a result of this intermedia conversion, a second problem arises, that of the leaching of surface retorting waste disposal practices; the "built-in" waste disposal practices of in situ processes have similar problems. The efficacy of methods to protect against leaching is yet to be proven, especially with regard to spent in situ retorts. In situ retorting sites are presently expected to be in areas of high ground-water levels. Ground-water increases permeability and thus facilitates leaching of soluble materials from the spent shale. Soluble materials in the spent shale would thus enter the ground-water and eventually surface streams and drinking water. Generally, it is not possible to clean up a polluted ground-water aquifer even if the source of pollution has been removed. Removal of the polluting source is not possible in the in situ context, however, because the polluting source is the entire underground retort.

Ground-water pollution caused by leaching is essentially unregulated and attempts at regulation will confront several problems. First, monitoring ground-water quality is far more difficult than monitoring surface water quality, making it almost impossible to assign liability for pollution. Second, the sources of ground-water pollution are non-point sources, resulting from in situ processes. Third, regulation can aim only at maintenance of present quality since improvement or clean up is not possible. Thus, only two methods of regulation are

428. Id.
429. Id. at 257.
430. Id. at 293.
431. Id. Note the serious effects that could occur if any of this highly alkaline—thatsalty—leachate runoff were to reach the Colorado River instead of the ground-water. Salisbury, supra note 285, at 13, col. 1.
432. "Intermedia conversion" is a conversion of waste from one form to another. In this instance, air and water pollution are being captured to form solid waste.
433. OFFICE OF TECH. ASSESSMENT, supra note 353, at 257. For a brief description of ideas under consideration for securing in situ retort, see infra notes 447-49 and accompanying text.
434. See supra note 412 and accompanying text.
435. OFFICE OF TECH. ASSESSMENT, supra note 353, at 294.
437. Tripp & Jaffe, supra note 436.
438. Id.
439. Id. at 5.
possible, land use controls or technological and operational controls.\textsuperscript{440} Presently, however, no comprehensive federal ground-water legislation exists.\textsuperscript{441} Although three different statutes\textsuperscript{442} regulate different facets of the shale problem, none are comprehensive. Only the Resource Conservation and Recovery Act of 1976 (RCRA) explicitly recognizes that non-point source discharges can pollute ground-waters,\textsuperscript{443} but the Act separates solid waste control from hazardous waste control.\textsuperscript{444} And even though hazardous waste regulations under the Act mandate leachate collection systems at disposal facilities,\textsuperscript{445} the solid waste regulations allow degradation of drinking water to the point of "endangerment."\textsuperscript{446}

Mitigation methods have been proposed within various shale development plans. Leachate collection systems similar to those required for hazardous waste facilities\textsuperscript{447} have been proposed for surface disposal areas.\textsuperscript{448} Far more complex methods have been proposed to deal with the problems of in situ ground-water leaching. Two of the most interesting include the use of extremely high temperatures in the retort to convert soluble solids to insoluble mineral complexes, and the creation of hydrologic barriers.\textsuperscript{449} In the former process, uncertainty exists in trying to achieve a uniform high temperature throughout the retort.\textsuperscript{450} The hydrologic barrier process involves surrounding and isolating the spent retort by means of a series of drill holes filled with cementitious slurry.\textsuperscript{451} It also has been suggested that artificial barriers be used to divert the ground-water around the retort and back into the

\textsuperscript{440} Id.
\textsuperscript{441} Id. at 9.
\textsuperscript{443} 42 U.S.C. § 6903(3) (1976); see Tripp & Jaffe, supra note 436, at 19.
\textsuperscript{446} Tripp & Jaffe, supra note 436, at 20. Recently, an attempt to develop a comprehensive national ground-water protection strategy based on these three statutes ran into an inter-agency conflict at EPA over which policy should allow degradation of ground-water. See generally Groundwater Strategy on Degradation Causes Internal Conflict Within Agency, 11 ENV'T REP. (BNA) 755 (1980).
\textsuperscript{448} OFFICE OF TECH. ASSESSMENT, supra note 353, at 306.
\textsuperscript{449} Id. at 308.
\textsuperscript{450} Id.
\textsuperscript{451} Id.
ground-water system.\(^{452}\)

C. Coal Gasification and Liquefaction

Coal supplies, plentiful as they are, can provide substantial assistance in ameliorating the nation's energy shortage. The environmental costs of coal, however, as compared to those of oil and gas, present serious financial and technological problems. Coal-based synfuels offer some significant benefits over the direct combustion of coal. However, they too are dirtier than the oil and gas they may replace.\(^{453}\) The most serious problems associated with coal conversion technologies center around solid waste and toxic control,\(^{454}\) water quality,\(^{455}\) and water quantity.\(^{456}\)

Although coal mining presents serious problems, such as waste disposal and reclamation, air pollution has always been thought to be the most serious problem of direct coal combustion. Synfuels conversion processes will substantially lessen the air pollution problem. Some of the pollutants normally emitted into the air will, instead, be captured, treated, and disposed of with the solid and liquid wastes.\(^{457}\) In addition, conversion and combustion of coal-based synfuels generally produce fewer emissions than direct combustion of coal, even when the latter is controlled.\(^{458}\) Conversion emissions are significantly offset by cleaner combustion of coal liquids and synthetic natural gases.\(^{459}\)

Probably, the most significant environmental problem of coal synfuels production is the disposal of large amounts of solid wastes containing some toxic chemicals and the associated problems of non-point source water pollution caused by leaching of waste sites.\(^{460}\) It is estimated that mining alone produces an average of 6,000 tons of waste for each 44,000 tons of coal mined,\(^{461}\) although as much as 18,000 tons

\(^{452}\) Id. at 308.

\(^{453}\) Note, supra note 332, at 402.

\(^{454}\) See infra text accompanying notes 459-75.

\(^{455}\) See infra text accompanying notes 476-80.

\(^{456}\) See infra text accompanying notes 481-85.

\(^{457}\) This conversion from air to water, or between discrete physical categories, is known as the "intermedia effect." See supra text accompanying note 432.

\(^{458}\) See Note, supra note 332, at 399. See also Hearings on H.R. 5045, supra note 324, at 485 (statement of S. Gage, Assistant Administrator for Research and Development, EPA).

\(^{459}\) Note, supra note 332, at 399 n.73.

\(^{460}\) Hearings on H.R. 5045, supra note 324, at 443 (statement of S. Gage, Assistant Administrator for Research and Development, EPA).

\(^{461}\) Note, supra note 332, at 395. Forty-four thousand tons of coal equals approximately one trillion Btu (at 22.8 million Btu to the ton).
may be produced.462 Synfuels production will require more mining with its accompanying waste. Additionally, wastes will be created during the conversion process.463 These conversion process wastes are estimated at between 4,000 and 5,000 tons per 44,000 tons of coal feedstock.464 The SRC-II demonstration plant planned for the Morgantown, West Virginia, area will use 6,000 tons of coal per day465 thus creating an average of 10,000 tons of waste from mining and conversion each week.466 By extension, one 50,000 barrel per day commercial plant would produce approximately three to four times as much waste while a 1.5 million barrel per day hard coal conversion industry467 would produce approximately fifty-five to sixty-six times as much—550,000 to 660,000 tons of waste each week.

All waste is not created equally, however. Due to the essential chemical fact of production under incomplete combustion468 conditions, the waste from the gasifiers (waste produced during the conversion process)469 contains high molecular weight organic compounds, some of which are known or suspected carcinogens.470 These com-

462. Id.
463. Id. It must be noted that it is the purpose to which the synfuels products are put that will determine whether a net waste increase occurs. If their consumption results in a net energy consumption increase, then total energy-related wastes will be higher. If, on the other hand, they are used solely to replace coal as power-plant feedstocks, net waste produced in the energy sector will be less, because conversion processes create less waste than direct combustion. If they are used to produce substitute liquid fuels by displacing imported oil but not power plant coal combustion, net waste will also be higher, since no domestic solid waste is involved in oil importation.

464. Note supra note 332, at 395-6. Lignite, a soft coal that will be used in the Great Plains Gasification Project, contains 14.46 million Btu per ton, with approximately 69,000 tons equalling one trillion Btu. GREAT PLAINS GAS, supra note 353, at 20. Thus more mining is necessary per barrel or cubic foot of product when lignite is used.

465. SRC-II, supra note 353, at 1-10. The SRC-II process creates 25 to 30 barrels of syncrude per ton; thus, the SRC-II demonstration plant will produce an average 15,000 to 18,000 barrels of syncrude daily.

466. See supra notes 461, 464. Six thousand tons per day multiplied by seven days equals 42,000 tons of coal. Forty-four thousand tons mined and processed, creates 6,000 tons of mining wastes, plus 4,000 tons of wastes from conversion.

467. A 1.5 million barrel per day hard coal conversion industry would result if seventy-five percent of the two million barrel synthetic fuel production goal, Energy Security Act, supra note 2, § 8721 (West Supp. 1980), were met with coal.

468. See supra text accompanying notes 370-71. Scientists call this incomplete combustion “reduction” or “reducing.”

469. Even direct liquefaction procedures use a gasifier. Hydrogen is a necessary ingredient and is produced on site by combustion of the mineral residue slurry, the initially unliquefied portion of coal feedstock that is separated out of the process. The gasification thus serves two purposes. It serves as the source of hydrogen, and it converts the slurry residues not gasified into a slag suitable for careful disposal. The gasifier is thus the major source of solid waste in the SRC-II process as well. SRC-II, supra note 353, at 2-4 to 2-12. For an excellent schematic diagram of the SRC-II process, see id. at 2-5.

470. Solid wastes may contain mineral residue, sludge from water treatment, particulates,
pounds often are water soluble and cannot be disposed of by conventional landfill methods. Rainwater would leach the landfills, dissolve the solids, and eventually pollute the ground-water. The SRC-II development plan calls for disposal in a secured (lined), landfill operated in accordance with RCRA requirements for hazardous waste disposal. These measures are expensive and not foolproof. One commentator notes that the disposal techniques do not guarantee that leaching will not occur.

There remain to be considered the non-process wastes and the water pollution problems of mining itself. Mine wastes generally are left behind and covered during reclamation. Additionally the mining process creates substantial non-point source water pollution problems. These are generally subsumed under the heading of acid mine drainage of dissolved solids. The latter comprise about one percent of the weight of coal mined, creating 400 tons per week's supply of coal for the SRC-II demonstration plant. The former is probably a more serious problem. Mine drainage has already degraded Appalachian waters and may do the same in North Dakota.

The other serious water question relates to the quantity of water to be used. Significant amounts of water are required, particularly in the West, to control dust and in reclamation of arid areas. Large quantities also are used in the processes, the exact amount depending on the process. Estimates vary greatly. The SRC-II process will use 4.3 million gallons per day consumptively, about two percent of the "7 day-10 year low flow" of Monongahela River. The Great Plains project, on

471. SRC-II, supra note 353, at 2-12.
472. Id. Landfilling is the process of burying wastes.
473. Id. For a discussion of ground-water pollution and its effects, see supra notes 433-45.
474. SRC-II, supra note 353, at 4-9.
476. See Note, supra note 332, at 396-97.
477. See id., at 397.
478. Id.; SRC-II, supra note 353, at 1-10.
479. Note, supra note 332, at 397; SRC-II, supra note 353, at 3-17.
480. "Infiltration of mine pit effluent would locally increase the mineralization of various shallow aquifers, and may affect the quality of the water from wells penetrating these aquifers. . . ." GREAT PLAINS GAS, supra note 353, at 3-26.
481. See Note, supra note 332, at 398; see also supra text accompanying notes 415-17.
482. SRC-II, supra note 353, at xx. Note the use of different units of measurement and different definitions of "use" (consumptive and non-consumptive); this phenomena leads to further
the other hand, a commercial size project, indicates a use of 15.84 million gallons daily but only fifteen percent "consumptively," around 2.37 million gallons per day for a far larger project.\(^{483}\) Another estimate made in congressional testimony prophesies 180,000 "acre-feet/year" for a 1.25 million barrel per day coal synfuels industry,\(^{484}\) an estimate that seems low against the Great Plains Gas estimate of 17,000 acre-feet/year for that alone.\(^{485}\) The only sure statement that can be made is that much political infighting and litigation will surround the attempted appropriation of scarce Western water.

D. Environmental Issues Summary

Six basic types of environmental problems with synfuel development—air pollution, water pollution, toxic wastes control, mining and land reclamation in arid areas, limited quantities of available surface water, the possible "greenhouse effect" and the relationship of each problem to each of the basic synfuel processes—have been noted.

As a result of more than ten years' focus on discrete sources of air and water pollution we have learned how to control and regulate these media of pollution both technologically and legally. Pollution creation has decreased with the development of efficient industrial processes, and pollution control has increased with the development of capture devices placed on waste disposal pipes and stacks.\(^{486}\) These developments have created a new problem and left others unresolved. The problem of "intermedia conversion,"\(^{487}\) such as the creation of toxic solid wastes instead of air pollutants, has become recognized. This problem is integrally related to other unsolved problems of solid waste disposal and ground-water pollution. Before synthetic fuel production can become a commercial reality, these two problems, solid or hazardous waste disposal (and its attendant land use and reclamation disputes) and ground-water pollution, must be addressed.

\(^{483}\) See Great Plains Gas, supra note 353, at 3-24, 3-25, 6-5.

\(^{484}\) Hearings on H.R. 5045, supra note 324, at 294 (statement of J. Gus Speth, Chairman, CEQ).

\(^{485}\) Great Plains Gas, supra note 353, at 3-24.

\(^{486}\) Examples of such developments are the closed system waste water recycling of the coal conversion plants and the use of gasifiers in direct liquefaction processes to produce hydrogen from what would otherwise be solid waste. See supra notes 354, 374.

\(^{487}\) See supra note 364.
V. CONCLUSION

The social and political questions surrounding synfuels policy remain unaddressed. Socially, the development of a synfuels industry of the size presently envisioned will radically change the way of life and the size of government in the American West. The development of new roads, schools, and other necessary services for the construction and operations personnel who could flood the West requires expenditures of millions of dollars. Will the people of Wyoming, Colorado, Utah, and Montana be willing to accept these potentially significant environmental and social burdens? And politically, are the citizens of the United States aware of and ready to accept the implicit meaning of a synfuels policy?

Synfuels policy proceeds from several unexamined and yet implicit assumptions. First, synfuels policy assumes the continuity of a fossil-fuel-based economy, a society based on automobiles, highways and resources controlled by persons located away from the communities where most Americans live. Second, a government-business partnership blurs the line between the public and private sectors by using public dollars and yet leaving real control in the hands of private industry which will continue to set energy policy. Third, reliance on the expertise of large public and private organizations, particularly the technical and managerial skills of large corporations, will build a synthetic fuels industry heavily dependent on the same few large corporations possessing the necessary expertise that already control the petroleum industry. Fourth, the Corporation will further a developing trend to central allocation of capital. Finally, and perhaps most importantly, synfuels policy perpetuates large-scale, centralized control over the energy industry, bypassing the choices among policy options that seek to devolve control over lifestyle and transportation to individuals or community-based groups.

VI. EPILOGUE

As this Article went to press, President Reagan had just issued Executive Order 12346 declaring the Corporation "fully operational." As such, remaining Department of Energy interim program funds were transferred to the Corporation and authority to approve financial assistance to synthetic fuels projects was granted. The Corporation has

begun the process of selecting projects for assistance, eleven having cleared initial “maturity” review.

Funding for the Corporation seemed secure. The Reagan Administration budget for fiscal year 1983 proposed $35.5 million for administration and technical evaluation, up from an estimated $24.5 million in fiscal year 1982. Of the $35.5 million, $17.47 million was for personnel compensation. The administrative expense budget was projected to rise to forty-one million dollars in fiscal year 1983.

The path to success was not clear, however. Several congressmen, led by Representatives Hank Brown of Colorado and Jack Kemp of New York, had introduced H.R. 5404, a bill to repeal in their entirety the sections of the Energy Security Act of 1980 that created the Corporation. Their theory is that the synthetic fuels industry can survive on its own without governmental assistance. The bill stands little chance of passing, however, with even the Administration’s enthusiastic budget-cutter, David Stockman, Director of the Office of Management and Budget, opposed to the repeal effort. Confirming that Stockman was not considering eliminating the Corporation, Office of Management and Budget spokesman Edwin Dale commented “I assure you that the SFC is as safe as a church.”

490. Id. at IV-16.
491. Id. at 5-44.