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Book Review

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BOOK REVIEWS

ONE TIME HARVEST: REFLECTIONS ON COAL AND OUR FUTURE, By Mike Jacobs. Jamestown, North Dakota: North Dakota Farmers Union, 1975. Pp. 300. (Paperback) $5.95.

Mike Jacobs, a free lance journalist, has been immersed in coal development issues since his days as a reporter for the *Dickinson Press*. Jacobs' articles reporting on the coal lease rush of the early 70's and the plans of out-of-state corporations to utilize lignite for coal gasification, were among the first to be printed in North Dakota newspapers.[1] Based upon this experience, Jacobs has written *One Time Harvest* which is a collection of essays on coal development. The topics covered reveal not only the depth of Jacobs' knowledge in the area, but the infinite aspects of what appears on the surface to be a simple issue—development of North Dakota coal reserves.

One Time Harvest opens with a detailed description of the world currently caught up in a food and fuel crisis, with North Dakota, standing in the wings, ready to play a major role in the solution. According to Jacobs, North Dakota's new prominence as a power and food producer is not an enviable position, or as the author states in the introduction:

> This book examines the industrial impetus in one state, North Dakota, and finds it frightening. The industrial frontier promises to leave the plains depleted, without a resource they once held. The coal men proposed to disrupt a land and life which is unique in the United States. The industrial frontier will change the Plains. To a large measure, noise will replace the quiet; rush will replace the easy pace of living; strangers will replace neighbors; smog will replace the big, clean sky; spoil piles will replace the verdant prairies and the peace and pleasure we take in our land and our people will be diminished. The nation will be less for the changes.[2]

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1. Jacobs, *BN Plays Key Role in N.D. Coal Speculation*, Dickinson Press, March 16, 1972, at 1, col. 3.
Jacobs, *Counties See Heavy Coal Leasing Activity*, Dickinson Press, October 5, 1972, at 1, col. 3.
Jacobs, *Companies Eye N.D. Coal Reserves*, Dickinson Press, Oct. 5, 1972, at 1, col. 3.
Jacobs, *There is Coal in Our Hills and Somebody Wants It*, North Dakota Union Farmer, Oct. 1972, at 12, col. 1.
Jacobs, *North Dakota OK's Coal Project*, Detroit Free Press, Dec. 12, 1973, at 12c, col. 8.
Jacobs currently publishes *The Onlooker*, a twice monthly news magazine printed in Mandan, North Dakota.
2. M. JACOBS, ONE TIME HARVEST 14 (1975).

At the onset, the reader is well aware of Jacobs' beliefs concerning development, yet anyone who is interested in either side of this issue will fine *One Time Harvest* rewarding reading. The author documents his evidence, and in many places overwhelms the reader with more facts than are necessary to prove his point. The very weight of his research has turned the book into more of an academic text than a propaganda vehicle for environmentalists.

Jacobs describes the current energy crisis as the result of over population and over consumption. The reader is not allowed to leisurely suggest that expanding production will solve the problem, for in the case of food production, current farming methods and diet are not energy efficient. American agriculture consumes more calories of fuel than it produces food. Jacobs indicates that:

> About 80 per cent of the world's annual energy expenditure would be needed to build a U.S. style agricultural system to feed the world. If food enough to feed the planet could be produced using such a system, the world's total known reserves of oil would be gone in 29 years. If India were to feed her population at a level of 3,000 calories per day, the American average, but 1,000 more than the average Indian now gets —she would need more energy in a year than she now uses for all purposes.[3]

Where will this energy come from? With oil reserves running low, coal has been heralded as the alternative energy source. But coal reserves are exhaustible and a social price must be paid for its use:

> The increased use of fossil fuel energy to produce food has resulted in some curses besides the blessing of abundant food. Fossil fuels can neither be obtained nor expended without environmental damage. The range of problems associated with increased fossil fuel use in agriculture is broad, from nutrients leaking into streams to poisons entering the air, to population growth in American cities. Of course, increasing use of fossil fuels on the farm draws down our exhaustible and nonrenewable fossil fuel reserves.[4]

Within this multi-crisis of energy, food, and population, Jacobs focuses on North Dakota as a leader in agriculture and a state possessing somewhere between 15 and 44 billion tons of mineable coal reserves.[5] In an effort to better understand what the future holds, Jacobs examines the state's past. He reports the all too familiar story of the state's political and economic control being based

3. *Id.* at 25.
4. *Id.*
5. *Id.* at 99.

in the board rooms of east coast railroads and grain dealers.[6] He parallels this story to the current plans of outside corporations to utilize North Dakota coal and water reserves. Jacobs pinpoints the primary difference between the state's past struggle with foreign grain dealers and today's tug of war with coal developers. A significant segment of the North Dakota farming and political community finds coal development advantageous.[7] The Rural Electric Cooperatives in North Dakota have a vested interest in coal development. Current coal powered electrical generating plants primarily supply RECs in North Dakota and surrounding states. Any effort to cut back development would be closely scrutinized by the cooperatives. The author observes that the combination of the REC's strength in state politics and the lobbying force of outside coal companies will provide coal development opponents a formidable opposition.[8]

Jacobs' research has resurrected the dreams and words of past state leaders who looked upon lignite as a source of wealth which would turn the state into a industrial center. A quotation from *North Dakota Magazine* in 1906 best describes the romantic view of lignite held by many North Dakotans over the year:

> The day will come . . . when the glory of the country will not be flax or wheat nor any of those things which pertain to the product of the farm, splendid as they are, but it will be coal, and the direct and indirect products of its consumption through the efforts and skill of American artisans employed in shop and factory and furnace.[9]

For years, the state's politicians and mining researchers had tried to interest the nation in low sulphur North Dakota lignite—but little happened. Suddenly in the 70's, the rush for new energy resources made the fulfillment of this turn of the century prediction appear imminent. Jacobs looks at the long sought after dream in the realities of modern industrial development and pronounced it spurious. The advantages of development are balanced against the multiple problems North Dakota will face—economically, socially, politically, and legally. Jacobs' survey of these problems in *One Time Harvest* will at least impress the reader with the fact that coal development is probably one of the most complicated issues North Dakotans have faced.

Economically, North Dakota must brace itself for the biggest boom and/or bust cycle of its short history. Coal development could leave the western counties depleted of their resources and tax base

6. *Id.* at 63-78.
7. *Id.* at 213-25.
8. *Id.* at 77, 213-25.
9. *Id.* at 54.

in 40 years or less. North Dakota itself might be the scene of clashes between alternative means of transportation. Power lines and pipelines will crisscross the state. Rail transportation will fight a life and death struggle with the advent of the economically advantageous coal slurry pipelines.[10]

Socially, North Dakota will have to contend with an influx of people, bringing urban problems to the plains. A higher level of pollution will exist, produced by the plants themselves and the allied activities brought on by the population increase.[11] Labor unions will rise as a potent policitcal force. Rival unions will descend on the state to vie for organizational rights at the various mines and plant sites. Counties which were once controlled by farmers will give in to the influence of industry and unions for their political make-up and tax base.[12]

Legally, the impact of coal development will determine questions of water and coal ownership. The question of who owns and has a right to appropriate the waters of the state is vital to coal development. Jacobs' section on water rights offers a good summary of the conflict now brewing over this issue between the state and the federal government.[13]

Jacobs describes in chapter after chapter the hard reality of coal development, a reality which cannot be denied by those who support development on whatever scale. Arguments will surround certain statistics cited by Jacobs, but as the author points out on many of the crucial questions, the answers just are not coming from anyone. For example, what will be the effect of sulphur pollution on the state's rainfall? Industry spokesmen are divided and many experts willingly indicate that more studies must be made before all the facts can be known.[14]

Certainly, the value judgments made by the author invite debate. Among his pronouncements are that: the forty-fourth legislative assembly failed to control development;[15] development must be resisted in order to encourage national development of alternative energy sources;[16] and West River Diversion was a facade to assist in total development of energy resources west of the Missouri and would have harmed current agricultural productivity.[17] However, these value judgments and more are advanced and argued in a manner that

10. *Id.* at 185-94.
11. *Id.* at 195-203.
12. *Id.* at 225-34.
13. *Id.* at 154-84.
14. *Id.* at 195-203.
15. *Id.* at 213-22.
16. *Id.* at 269-70.
17. *Id.* at 161-70.

invites further debate from all who are seeking rational answers to the questions of coal development.

Jacobs' book is one of the unique efforts in North Dakota and in all of the Great Plains states to present a total picture of coal development. His contribution to the development debate is noteworthy. *One Time Harvest* will sharpen the issue, aid in the dissemination of information on the coal question, and encourage more intelligent governmental decision making on this issue.

CHARLES W. LAGRAVE*

THE LIQUID METAL FAST BREEDER REACTOR, AN ENVIRONMENTAL AND ECONOMIC CRITIQUE. By Thomas B. Cochran. Baltimore: The John Hopkins University Press, 1974. Pp. XIV, 271. $6.95 (paperback).

One of the most difficult and far-reaching energy questions currently under discussion is the breeder reactor program.[1] Among the major issues are: is electrical energy demand likely to outrun supply in the near (intermediate) (far) future; should the U.S. increase its reliance on fission power; should government finance new technologies to be applied and used almost exclusively by private utilities; could the money be better spent on other technologies (coal utilization, solar, fusion, etc.); is the liquid metal fast breeder (LMFBR), which uses liquid sodium as a coolant, the best design, or is some other design such as the high-temperature gas breeder (HTGBR), which uses gas for the coolant, better? Each of these policy questions, of course, breaks down into innumerable, more technical sub-questions.

Simply noting the government documents of the past 18 months which are concerned with one or more of these questions would be an enormous undertaking.[2] Actually reading and analyzing them is

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1. A breeder reactor is one which produces both electrical power and more fuel, as distinct from a normal reactor which produces only power.

2. The following have crossed by desk: *Hearings Before the Subcommittee on Energy and the Environment, Committee on Interior and Insular Affairs*, 94th Cong., 1st Sess., ser. 16, pt. II (1975); ERDA, DRAFT ENVIRONMENTAL STATEMENT, EXPANSION OF U.S. URANIUM ENRICHMENT CAPACITY (June, 1975); NRC, SPECIAL SAFEGUARDS STUDY, SCOPES OF WORK (June, 1975); NSF, ENERGY INDUSTRIAL CENTER STUDY (June, 1975); NSF, ENERGY ALTERNATIVES, A COMPARATIVE ANALYSIS (May, 1975); AEC, PROPOSED FINAL ENVIRONMENTAL STATEMENT, LIQUID METAL FAST BREEDER REACTOR PROGRAM 7 vols. (Dec., 1974); DRAFT, GENERIC ENVIRONMENTAL STATEMENT MIXED OXIDE FUEL 4 vols. (Aug., 1974).

probably beyond the ability of any person unwilling to spend several years of full-time effort. As Edmund Wilson is supposed to have said upon first reading *Finnegan's Wake*, what is needed is a team of scholars and critics working for ten years. The comparison with *Finnegan's Wake* is obvious when one constantly encounters paragraphs such as:

> A typical fuel module in the Shippingport LWBR core contains a central, axially-movable, hexagonal seed and a stationary, annular, hexagonal blanket (see figure 6A.1-34). The Shippingport core will be a breeder core rather than a prebreeder core (see Section 6A.1.3.3.2. below). The seed is made up of full length Zircallory-4 clad fuel rods about 0.3 in. in diameter. The seed consists of solid thorium oxide (ThO^2) pellets containing 0 to 6 wt% U-233 oxide ($^{233}UO_2$). . . .[3]

Leaving aside the constant cross-referencing, it is clear that some liberties have been taken with the English language—how can one have an "annular ("of, relating to, or forming a ring"),[4] hexagonal ("having six angles and six sides")"[5] anything?

For those of us unwilling to plow through several thousand pages of such jargon (and the economic analysis sections tend to be equally bad) Thomas B. Cochran has written a brief paperback entitled *The Liquid Metal Fast Breeder Reactor, An Environmental and Economic Critique*. As the title clearly implies, this is not an objective summary of the subject, it is a critique of the proposals current at the time of writing and the arguments used to support them. It is, however, as readable as such a book can be and is highly recommended to those interested in the subject.

The major part of the book is devoted to an analysis of the economics of the LMFBR as presented by the AEC in 1972 on the basis of studies done in 1970. It should be noted that Cochran considers his analysis of the economic considerations equally valid for the 1973 figures used in the *LMFBR PFES*.[6] Summarizing Cochran's economic analysis in one sentence is relatively simple—the LMFBR will not be economically justifiable and competitive until well after 1986, the date of its proposed introduction, and delay of even 20 years would not hurt the U.S. economy.

Cochran reaches these conclusions by analyzing the AEC figures and arguments seriatem and collectively. He contends that the 7

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3. AEC, PROPOSED FINAL ENVIRONMENTAL STATEMENT, LIQUID METAL FAST BREEDER REACTOR PROGRAM vol. III, at 6A.1-114 (Dec., 1974).
4. WEBSTER'S NEW COLLEGIATE DICTIONARY (7th ed., 1966).
5. *Id.*
6. "The basic arguments have not changed . . . and the principal differences are in updating of numbers." AEC, PROPOSED FINAL ENVIRONMENTAL STATEMENT, LIQUID METAL FAST BREEDER REACTOR PROGRAM vol. VI, at 38-159 (Dec., 1974).

per cent discount rate used is unreasonably low, which results in incorrect figures being used in the cost-benefit analysis. He discusses in very convincing fashion the underestimates of capital costs by the AEC. This section is particularly interesting to a non-economist as it discusses the "learning curve" problem which crops up frequently in energy program discussions, whether nuclear, solar, geothermal or coal-gasification.[7]

An entire chapter is devoted to a discussion of uranium supply and demand forecasts. This is a much mooted subject and one that frequently appears in licensing hearings for individual plants.[8] Although there can be no definitive answer to such issues, the discussion presented here is quite clear and capable of being understood by a non-economist, and any lawyer who anticipates ever litigating on this subject would do well to read it. On the recurrent problem of energy demand forecasting[9] Cochran's discussion is good, but not, in this reviewer's opinion, up to the level of the uranium supply discussion.

After discussing the economic aspects of the LMFBR Cochran goes on to discuss the environmental and safety problems that can occur. Anyone who has followed the LMFBR controversy will find nothing particularly new here, but the discussion is relatively well organized and presented. A major defect is the failure to really discuss the problems of "Unauthorized Use of Fissile Materials," which is dispensed with in 5 pages. For a very well written popular treatment of this subject the interested reader should refer to John McPhee's *The Curve of Binding Energy* (1974). To learn what is being done about these problems, refer to the *Special Safeguards Study, Scopes of Work.*[10]

At this point it might be useful to stand back a bit and see what a book such as Cochran's can tell us about the broader issues of decision-making. If there is one thing that comes through clearly it is that when dealing with extremely complicated issues such as the LMFBR an environmental impact statement is far from the most useful document in the world, unless the reader is prepared to sit down and do a detailed analysis himself. The question, then, is

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7. In economic theory, as experience in constructing an item increases, the cost of construction should decrease. This is similar to the economic theories behind economies of scale and mass-production. The issue is whether-a-concept which is demonstrably correct when applied to automobiles or refrigerators, (specific products) can be applied to whole fields of technology (breeder reactors, solar power), especially when each new unit (plant) will be incorporating refinements not found in its predecessor.

8. *See, e.g.*, Bronstein, *State Regulation of Power Plant Siting*, 3 ENVIRONMENTAL LAW 273, 307ff (1973).

9. *See, e.g.*, Bronstein, *The AEC Decision-Making Process and the Environment*, 1 ECOLOGY L.Q. 689 (1971).

10. NRC, SPECIAL SAFEGUARDS STUDY, SCOPES OF WORK (June, 1975).

what will the Congress do when given such a massive set as the *LMFBR PFES?*

When the Office of Technology Assessment was created in 1972[11] some of us with an interest in science policy and decision-making hoped that it would be used to provide Congress with an analysis of the environmental impact statements submitted with proposed legislation. "Technology assessment is defined as an activity to provide information about, and systematic analysis of, the internal and external consequences (short, medium, and long term) for a society of the application and diffusion of a technological capability into its physical, social, economic, and political systems."[12] To this author, this is an excellent working definition of an environmental impact statement as NEPA has been interpreted in innumerable decisions. Yet, to the best of my knowledge, OTA has never done an analysis of an EIS for the use of the ordinary congressman.

To date one of the few in-house OTA work-products to have appeared publicly is an analysis of the problems of oil spills and pollution from tankers.[13] It appears to be a reasonably well researched compilation of facts and possible alternative courses of action. It clearly does not, however, attempt to make any recommendations, other than the usual calls for further data collection and research.

> The principal purpose of this report is to provide a broad factual base for use by the Congress in further investigation of major issues and resolution of policy questions. This factual base includes advantages and disadvantages of alternatives for reducing tanker pollution and improving safety of operations. It is not the purpose of this report to develop those legislative or regulatory measures which will be necessary to implement the technical alternatives presented.[14]

This hardly fits the definition of technology assessment. As such, one wonders why the old, established Congressional Research Service of the Library of Congress was not charged with the responsibility for preparing this report, enabling the presumably higher-powered, more technically trained OTA people to work on something like an analysis of the *LMFBR EIS.*

The practical answer to this question of the apparent underutilization of OTA's resources, of course, is political. Craig Decker,

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11. Technology Assessment Act of 1972, Pub. L. No. 92-484, ——Stat.——.

12. SCIENCE STUDY COUNCIL OF CANADA BACKGROUND STUDY NO. 30, A TECHNOLOGY ASSESSMENT SYSTEM 26 (M. Gibbons and R. Voyer, 1974).

13. OFFICE OF TECHNOLOGY ASSESSMENT, OIL TRANSPORTATION BY TANKERS: AN ANALYSIS OF MARINE POLLUTION AND SAFETY MEASURES (July, 1975).

14. *Id.* at XV.

an OTA staff member, said as much at a panel discussion on OTA at the January, 1975 meeting of The American Association for the Advancement of Science. He expressed the opinion that, until such time as Congress had developed some degree of confidence in the ability and objectivity of OTA, it would be best for OTA to avoid taking positions on truly controversial subjects.

Hopefully, OTA will emerge from its shell in the near future. The number of major decisions which can affect the future of the nation and the world for better or worse is constantly growing. The LMFBR program is clearly one of the largest. Fortunately, if one believes Cochran's analysis, it is a decision that can be delayed for some time without major adverse effects; but if one disagrees with Cochran, who makes no pretense of being unbiased, then what? In any case, it is strongly recommended that everyone interested in the LMFBR read Cochran's book, and it is hoped that the members of Congress, who must make the final decision, will. We are all lucky that the book exists as it gives reason to hope that there will be a more rational decision than would occur in its absence. The lack of such a book on the fluorocarbon controversy,[15] to pick another major issue at random, and the lack of vigour being exhibited by OTA, however, do not bode well for governmental decision-making in such technical areas.

DANIEL A. BRONSTEIN*

15. Is the release of the fluorocarbons used as propellants in aerosol cans endangering the ozone layer thus increasing the skin cancer risk? *Theory on Fluorocarbon Peril to Earth's Ozone is Supported*, N.Y. Times, Sept. 10, 1975, p. 1, col. 7 Is it changing the climate? *Climatic Changes by Aerosols in Atmosphere Feared*, N.Y. Times, Sept. 14, 1975, p. 1, col. 7.

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