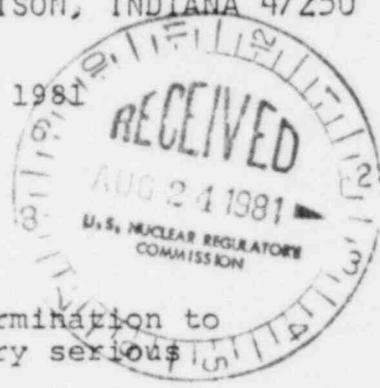


DOCKET NUMBER 50-367
FRED. & DUTCH...

SAVE THE VALLEY
P. O. BOX 813, MADISON, INDIANA 47250



TO WHOM IT MAY CONCERN:

April 10, 1981

SUBJECT: PSI's Impending Financial Problems

Friends:

A number of indications imply that PSI, in their determination to rush the building of Marble Hill, has ignored some very serious financial eventualities that are in store.

We are sure that you must be aware that the entire electric utility industry is experiencing hard times. It has become impossible to increase utility dividends at any rate approaching that of inflation! Because PSI in the past enjoyed good management, it is currently in a little sounder condition than some systems. But, our analysis of today's rapidly changing conditions indicates that PSI's finances are in for some rough sledding. Their upcoming traumatic problems will be due to:

1. Marble Hill's Exorbitant Cost

When originally planned in 1974 and 1975, Marble Hill's cost was estimated at only \$1.4 billion. Belatedly, in 1980, management finally increased their cost estimate to \$3.4 billion. But, an almost identical \$1.5 billion (1975 estimates) 2300 megawatt Westinghouse facility in New York State was re-estimated in 1979 to cost \$4.5 billion! Further, there are many indications that even \$4.5 billion may be at least \$1 billion too low! MIT's expert, I. C. Bupp, has estimated nuclear power's cost escalation at 21% annually, and that was before Three Mile Island!

Using the industry's optimistic 30-year reactor life, even Marble Hill's estimated \$4.5 billion capital cost will require \$565 million per year for debt retirement alone. When compared with last year's total revenue of \$640 million, this \$565 annual debt payment should cause all of PSI's management grave concern. Even the power export market to the North has all but vanished, and the national electric utility reserve capacity has now risen to 43% and is still rising! There are no indications that these national reserves will reach 55% before 1985! PSI has tried to reduce the appearance of their own excess capacity by shortening theoretical plant lives on all coal-fired facilities to an unheard of 30 years, even though common knowledge puts these plant-life figures at 40 to 50 years. Annual Report figures indicate that PSI currently has generating capacity reserves in excess of 50%. Standard reserves have previously been pegged at 17-20% by PSI and most other utilities.

2. Very Large Natural Gas Supplies

The availability of continued ample supplies of natural gas is rapidly removing PSI's winter load growth. Indiana Gas Co. alone has recently added more than 18000 new customers. This change is a national trend.

D503
5/11

Because natural gas costs less than 1/3 the cost of energy from resistance and half that from an electric heat pump, Public Service Indiana will soon again return to summer peaking. The gas industry confidently forecasts increasing large supplies past the year 2000! PSI can be no exception to this strong national trend.

3. 5%+ Real-Dollar Electricity Cost Increases

Past empirical measurements over more than 30 years indicate that electricity consumption (per person and per unit of production) will decrease by an average of about 30% as the real-dollar cost doubles by about 1995! This 30% reduction is a total of all use by all classes of users, and is estimated from measurements taken in many different parts of the United States. PSI again can be no exception.

4. The PURPA Guidelines

Consumption changes resulting from just the suggested time-of-use rate structures discussed in the Public Utility Regulatory Policy Act (PURPA) will be almost certain to stop peak growth for a decade or more. PSI, we emphasize, can be no exception!

5. Indiana's Slow Population Growth

Indiana's population, along with that of most of the Midwest and East, is growing at less than half the average U.S. growth rate. This slow growth alone is a powerful indication that Indiana's electrical energy growth will be much slower than the anticipated U. S. average of 2½% annually. Yet PSI, after its third reduction in peak projections since 1977, is still forecasting growth rates nearly double national rates! The Bureau of Economic Analysis of the U. S. Commerce Department continues to place Indiana and all surrounding states in a very slow growth category.

Be sure to study the attached chart on PSI's peak forecasts. See that the 1985 demand has been lowered from 7120 megawatts to 4600, a drop much greater than the capacities of both Marble Hill units!

The net effect of the above impacts will be that Marble Hill's capacity will be unneeded, probably even by the year 2000! Financial prudence would indicate that construction cease while PSI's officers and directors, the ones who bear the real responsibility for a fiasco, and whose reputations and financial integrity ride on this responsibility, reassess their options!

copies to:
PSI Officers
and Directors
STV Mailing list
Media and Industry

Again, offered with concern

Fred Hauck
Fred Hauck
Engineering Consultant
Harold G. Cassidy
Harold G. Cassidy
Professor Emeritus
Yale University

NEW ENERGY SOURCES

APPROXIMATE COST PER MILLION BTU'S END-USE ENERGY (1981 DOLLARS)

SOURCE	\$4.5 Billion Nuclear Plant 2260 MW	\$35 Billion North Slope Natural Gas	\$17.5 Billion Deep Basin Natural Gas	\$6.5 Billion Domestic Natural Gas
Capital Cost Amortized in 30 years-12%	\$13.45	\$2.50 (45 yrs)	\$2.00	\$0.75
Fuel Costs	2.29 (7.8 mils per kwh)	2.50 (per Mcf)	5.00 (per Mcf)	5.00 (per Mcf)
Insurance	.10	.01	.01	.01
Labor	.15	.05	.03	.02
Maintenance	1.00	.25	.10	.05
APPROX. TOTALS	\$17.00/MM BTU	\$5.50/MM BTU	\$7.00/MM	\$6.00/MM
Lifetime Energy	1.26x10 ¹⁵ BTU (over 30 years) @12.17 billion kwhrs/year	30x10 ¹⁵ BTU (over 50 years) @2.5 billion cu ft / day	30x10 ¹⁵ BTU (over 50 years) @2.5 billion cu ft / day	4x10 ¹⁵ BTU (over 20 years) @0.6 billion cu ft / day
Equivalent to	1 Marble Hill	24 Marble Hills	24 Marble Hills	3 Marble Hills
	= 5.8¢/kwh (+ Dist. cost)	= \$5.50/Mcf (+ Dist. Cost)	= \$7.00/Mcf (+ Dist. Cost)	= \$6.00/Mcf (+ Dist. Cost)

From the above figures it's easily seen that nuclear energy's major costs are related to its capital requirements. Natural gas costs seem mainly related to the well-head cost of the gas itself!

Will political clout or economics determine where our new energy sources will be developed? Certainly the marginal (new source) cost of natural gas will be less than one-half that of electricity! Since an average family uses about 12 million BTU's of energy monthly, one can choose to underwrite either a \$200 monthly (if all energy comes from new sources) nuclear building program or an \$80 monthly natural gas building program!

March 26, 1981

FRED HAUCK

TO WHOM IT MAY CONCERN

P. O. Box 391

Subject: ENERGY'S CAPITAL COSTS

or
Route 3, Tower Heights
Shelbyville, Ky 40065

Friends:

The two sheets attached tell interesting stories about the tremendous costs of supplying energy by building nuclear power plants. These costs are compared with natural gas costs revealed by the latest information.

Here are the numbers as we have analyzed them:

CAPITAL COST TO BUILD MARPLE HILL
(2260 MW Westinghouse PWR)

\$4.5 Billion Capital Cost = \$3.57 per million BTU's
(furnished over the plant lifetime)

2260x1000x62½x24x365x30x3412

CAPITAL COST TO BUILD THE NEW ALASKAN NATURAL GAS PIPELINE
(The most expensive source of new natural gas)

\$35 Billion Capital Cost = \$1.18 per million BTU's
(furnished over the 50-year lifetime)

2.5x10⁹x1000x65½x365x50

CAPITAL COST FOR THE NEW PANHANDLE EASTERN PIPELINE ADDITION
(A less expensive source of new natural gas)

\$64.2 Million = \$0.05 per million BTU's
(furnished over the 20-year lifetime)

.243x10⁹x1000x65½x365x20

THE MULTI-BILLION DOLLAR QUESTIONS:

Why are our "experts" recommending the spending of -

\$3.57 for a million BTU's of energy from nuclear,

when we can get the same amount of energy from natural gas for

\$1.18 from Alaska

or

\$0.05 from Louisiana.

NOTE: All energy is expensive but nuclear energy is exorbitant! Since an average family uses about 12 million BTU's of energy monthly, you can choose to underwrite either a \$42 monthly nuclear building program or a 60¢ monthly natural gas building program. Which addition to your monthly bill are you voting for?

Subject: NATURAL GAS vs. NUCLEAR ELECTRICITY
 (a) Capital Cost Comparison

March 1, 1981

Friends:

A detailed examination of capital costs shows that nuclear electrical energy costs an astounding 3-times as much per energy unit delivered as will the future use of very expensive North Slope natural gas. Our calculations follow:

<u>NORTH SLOPE NATURAL GAS</u>	<u>A 2260 MEGAWATT NUCLEAR FACILITY</u>
Capacity: 2.5 billion cu. ft./day Life: 30 yrs (probable min) Efficiency: 65% (end use) Est. Cost: \$35 billion	Capacity: 62% x 2260 MW Life: 30 yrs (probable max) Efficiency: 100% (end use) Est. Cost: \$4.5 billion
Calculations: $2.5 \times 10^9 \times 1000 \times 365 \times 50 \times 65\%$ $= 29.65 \times 10^{15}$ BTU's for \$35 billion	Calculations: $2260 \times 1000 \times 62\% \times 24 \times 365 \times 30 \times 3412$ $= 1.26 \times 10^{15}$ BTU's for \$4.5 billion
<u>\$1.18 per million BTU's</u>	or <u>\$3.57 per million BTU's</u>

Our Comment: SHOULD NOT THE CURRENT MONEY SITUATION CAUSE
 OUR BANKERS TO SHUDDER AT THIS TREMENDOUS COST DISPARITY?

IN CAPITAL COSTS ALONE

Fred Hauck

North Slope Natural Gas Is:

67% Cheaper per BTU of End Use Energy
 and will deliver:

14-times as much energy per year

and will be equal to at least 24 Marble Hills in total energy output!

Shelbyville, Ky. 40065
October 31, 1979

FRED HAUCK
Environmental Consultants,
P. O. Box 391,
or
Route 3, Tower Heights,
Shelbyville, Ky. 40065

"PSI's DECLINING PEAK FORECASTS"

This curve (see attached) indicates that PSI has rapidly and steadily reduced 1985 peak growth expectations. Beginning with the June 1973 forecast, the peak expected in 1985 has been reduced from 7120 megawatts to the currently forecast 5035* megawatts. This rate of reduction (more than 300 Mw/year) would seem to assure that the maximum 1985 peak expected by STV of about 4500 megawatts could not possibly be exceeded.

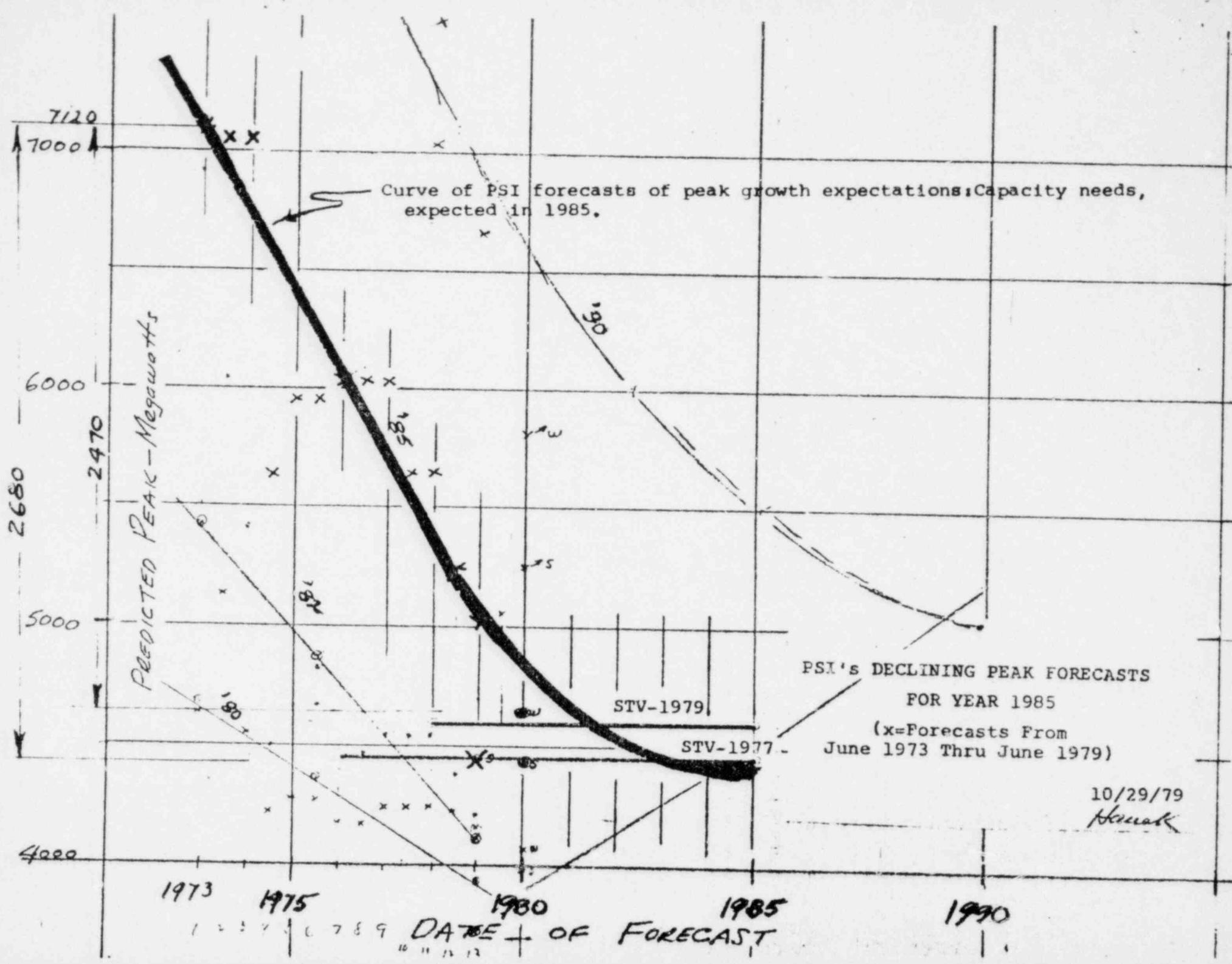
PSI's current capacity (including Gibson #4) is 5700 megawatts. Gibson #5, scheduled to go on line in 1983 will bring total capacity to 6350 megawatts.

Thus, PSI reserves (reserve-to-peak ratio) are likely to be a minimum of 43% in 1985 without any of Marble Hill's capacity. Reserves at this moment are actually 53%!

Since the industry reserve standard is only 20%, what does PSI intend to do with this wasteful surplus?

Are the Valley residents expected to bear the pollutant load for power to be exported to the north and east?

* (6/30/80) - PSI's latest quarterly report again reduces their estimate of 1985 need! It is now 4650 mW (Winter) and 4440 (summer). Because of rapidly increasing natural gas supplies PSI will soon again become summer peaking. This latest estimate has therefore reduced the 1985 peak by 2680 megawatts (from 7120 to 4440), even more than the total capacity of both Marble Hill units! They still seem to feel no need to reduce their hell-bent-for-leather building program! It's also interesting to note that Save-the-Valley's forecast of PSI's maximum 1985 peak given during the NRC hearings in Madison was 4450 megawatts! (Mar, April 1977)



April 10, 1981

PSI's WEAKENING POSITION



An open letter To Whom It May Concern

1 - PEAK GROWTH

PSI's peak growth has been linear (straight-line) for many years. Peaks are not growing at a compound rate as PSI has fantasied far too long. Figure 1 is a copy of the curves submitted to the NRC at the Madison hearings 4 years ago. Note that STV's linear projection 4 years ago indicated a 4460 megawatt peak for the year 1985. After many PSI peak reductions over the last 7 years, they, PSI, are now forecasting a 1985 summer peak of only 4440 MW, 20 MW below STV's peak forecast made in 1977. Even their present winter forecast is only 4650 MW. PSI will soon again become summer peaking because of vastly increased natural gas supplies. PSI's 1973 estimate of the 1985 peak has now been lowered by much more than the total capacities of both the proposed Marble Hill units!

2 - PSI RESERVES

FERC data gives PSI's current generating capacity as 5694 MW. PSI's 1979 Annual Report lists total capacity as 5716 MW. The PSI 1980 Annual Report gives their all-time system peak (Summer 1980) as 3896 MW. Using the lower FERC data, we have:

5694 current total capacity (without proposed Marble Hill)
- 3896 all-time system peak
= 1798 reserves / 3896 = 46% reserves

If we should add 650 MW for Gibson #5, these reserves would be:

2448 / 3896 = 63% reserves

"Standard" reserves, as admitted by PSI in the past, have been considered as 17% to 20%! (Extra unneeded capacity increases the rate-base.)

3 - INDIANA'S FUTURE GROWTH

The 1980 Census indicates that Indiana and the nearby states of Illinois, Ohio, Pennsylvania, W.V. and Kentucky have grown at only 30% of the national population growth rate. The Western States of Texas, AZ, CA, or Nevada and NM grew at 199% of national, while IN, N. & S. Carolina, GA, FL, AL, Mississippi, LA and Arkansas, grew at 184% of national. Further, out-migration from Indiana and nearby states seemingly is even increasing according to news reports and continuing pessimistic auto and steel data.

4 - INCENTIVES TO BUILD UNNEEDED CAPACITY

Dr. Duane Chapman of Cornell University has compiled a detailed 43-page report showing 7 "subsidies" that encourage the building of new electrical

capacity whether it is likely to be needed or not. These "subsidies" for a theoretical utility in Southern Indiana that is building a 2260 MW nuclear facility, would total, in just the last 5 years of construction before going on line:

\$1.86 billion to the utility (similar to retained earnings)

plus \$111,000 in essentially "for free" stock in the utility to every executive making \$100,000 or more annually!

(Essentially, according to Chapman's report, all participating utility employees from the janitor up, would receive the equivalent of more than 1 year's salary in free stock over a period of perhaps 15 years. These stock plans are also available to other industries, but electric utilities are perhaps 10-times as capital intensive, so total stock value will be 10-times as great!)

5 - OTHER INDICATORS OF FUTURE SLOW GROWTH IN ELECTRICITY DEMAND

Please refer to the previous report we sent you*, and especially to the paragraphs headed:

- "Marble Hill's Exorbitant Cost"
- "Very Large Natural Gas Supplies"
- "5%+ Real-Dollar Electricity Cost Increases"
- "The PURPA Guidelines"

These paragraphs give additional logic for the expected future very slow electricity growth rates. Since PSI seems to lower the estimates of their generating reserves much below the figures we have given, we list below their apparent tactics:

- a. By reducing 40-year coal-fired lives to 30 years, far below even the 35-year book life recommended by FERC. Even a 52-year life can be realistic for a well-maintained coal-fired plant.
- b. By wholesaling power to other utilities during PSI peaks. We have suspected that "games" could be played with such nearby utilities as IPALCO and NIPSCO, but that's pretty difficult to prove. PSI's Annual Report doesn't list wholesale sales.
- c. To obviate installation of scrubbers, etc., PSI has agreed** to operate some units below full rating.

Everything that we have learned about all utility over-capacity indicates that PSI will find it increasingly difficult to export electricity in any direction. It would seem that PSI should cut their losses by stopping work on Marble Hill now.

Offer in concern for the possible harsh effects of a potential corporate meltdown upon the Company and public:

Fred Hauck

Harold G. Cassidy

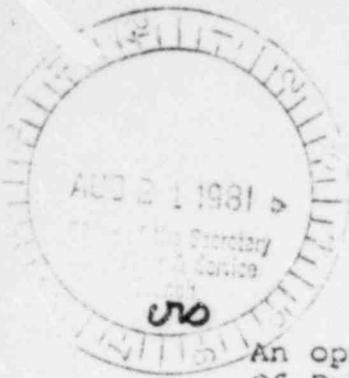
*Copies available.

**For whatever reason this has been done, the total capacity is still there and available to the rate-base.

Sent to: Officers of PSI, Members of the Board of PSI, Media, Industries, selected lists, and Save The Valley officers.

SAVE THE VALLEY

SAVE THE VALLEY, INC., P. O. BOX 813, MADISON, INDIANA 47250



March 18, 1981

An open letter to the Board of Directors and Management
Of Public Service Indiana
On the subject of MARBLE HILL

Ladies and Gentlemen:

We address ourselves to Management for reasons that are obvious; we address ourselves to the Board because not only are their reputations involved but also because of a growing realization that they have legal responsibilities toward Company management for which they are accountable. [See the wall Street Journal, Section 2, March 3, 1981.]

The shoddy work in safety related structures that has come to light has destroyed public confidence in Marble Hill. What is the value of an impressive-appearing spread of buildings, and forests of rusting reinforcement bars, if they hide a diseased body? And resumed pouring of safety-related concrete has still not been sanctioned by the Nuclear Regulatory Commission.

Meanwhile new regulations and worries for all nuclear plants continue to pile up in the aftermath of Three Mile Island. Organic Gardening, March 1981, p. 119, reports that a public information officer at TMI, John Fidler, says clean-up of the plant will run to \$1 billion. Also that according to a Pennsylvania State University study the cost of household evacuations within the 15-mile area was between \$6 million and \$10 million; the cost of lost work days between \$3 million and \$4.5 million, with large hidden costs to health and in stress.

In view of these considerations, and of the rapidly changing picture of the availability of natural gas one has to ask "Can PSI survive building and carrying Marble Hill?" The attached sheet suggests that new gas discoveries will make Marble Hill power plant obsolete before it can be finished. The financial effects may well cause grave concern to PSI rate payers, or so we think.

Isn't this time to cut losses, before pouring more money into Marble Hill? Much of the investment already made can surely be put to more benign uses.

Very truly yours,

Harold G. Cassidy *Fred Hauck*

Harold G. Cassidy Fred Hauck
Board members, Save The Valley

Subject: NATURAL GAS vs. NUCLEAR ELECTRICITY

(a) Capital Cost Comparison

March 1, 1981

Friends:

A detailed examination of capital costs shows that nuclear electrical energy costs an astounding 3-times as much per energy unit delivered as will the future use of very expensive North Slope natural gas. Our calculations follow:

<u>NORTH SLOPE NATURAL GAS</u>	<u>A 2260 MEGAWATT NUCLEAR FACILITY</u>
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<u>\$1.18 per million BTU's</u>	or <u>\$3.57 per million BTU's</u>

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IN CAPITAL COSTS ALONE

North Slope Natural Gas is:

Fred Hauck

67% Cheaper per BTU of End Use Energy
and will deliver:

14-times as much energy per year

and will be equal to at least 24 Marble Hills in total energy output!



50-362

SAVE THE VALLEY
P. O. BOX 813, MADISON, INDIANA 47250

THE BEGINNING OF THE AGE OF REASON
IN THE "SUN BELT"

TVA Manager Urges
Utility to Cut Back
Nuclear Plant Program

7/28/81

Special to THE WALL STREET JOURNAL.
KNOXVILLE, Tenn. - The Tennessee Valley Authority's general manager warned that the utility must trim its ambitious nuclear plant construction program to avoid spiraling rate increases.

William Willis recommended that the TVA halt construction at one nuclear plant and put off completion of two others. Any cutbacks in the nation's largest nuclear construction program are subject to approval by the TVA's three-member board.

Mr. Willis said that trimming the program will give relief to the public utility's 2.8 million customers in seven states, but also will result in the layoff of about 6,300 workers.

Based on a staff revision of load forecasts, Mr. Willis urged the board to stop construction on the 42%-complete Phipps Bend nuclear plant, which employs 3,500 workers 70 miles northeast of Knoxville. Mr. Willis also recommended that the completion of the Yellow Creek nuclear plant in northeastern Mississippi and the Hartsville nuclear plant near Nashville be postponed until about 1991, three years later than currently scheduled.

Mr. Willis's recommendation is subject to TVA board approval at a public hearing here Aug. 6. Approval is almost a certainty, officials said.

The staff found that despite a growing economy, power demand dropped for the TVA from 1973 to 1979. Meanwhile, the cost of borrowing \$2 billion annually to finance nuclear plant construction has been a major factor in the revenue deficit that is causing rate increases, the staff said.

Rates have increased on the average of 15% a year from 1974 to 1981.

In 1974, the TVA had planned to build 17 nuclear reactors. It currently has four of the units operating and a fifth licensed. Two other plants currently under construction, the Watts Bar in East Tennessee and the Belfonte plant in northern Alabama, wouldn't be affected by the cutback.

As recently as March, TVA officials had defended their original nuclear program.

TVA general manager warns that "the utility must trim its ambitious nuclear plant construction program to avoid spiraling rate increases."

" . . . trimming the program will give relief to the public utility's 2.8 million customers in 7 states. . . "

. . . he "urged the board to stop construction on the 42%-complete Phipps Bend (2 units @1233 mW) plant . . . and recommend that the completion of the Yellow Creek (2 units @ 1285 mW) nuclear plant . . . and the Hartsville (4 units @1233 mW) plant be postponed until about 1991 "

"The staff found that despite a growing economy, power demand dropped for the TVA from 1973 to 1979. Meanwhile, the cost of borrowing \$2 billion annually to finance nuclear construction has been a major factor in the revenue deficit that is causing rate increases "

Receipts:
Phipps B - 1233
 1233
Yellow Creek - 1285
 1285
Hartsville - 1233
 1233
 1233
 1233
TOTAL = 496 Pmw

Handwritten signature and date: 7/28/81

A WHITE PAPER XVI



THE TRUE COST OF THE PROPOSED
MARBLE HILL NUCLEAR STATION

Prepared for SAVE THE VALLEY, INC. by Harold G. Cassidy, Ph.D., Emeritus Professor in Chemistry, Yale University, and Member of the Board of Save The Valley, Inc., a not-for-profit Kentucky Organization, licensed in Indiana, Box 813, Madison, Indiana 47250. © Harold G. Cassidy, 1981.

"DON'T BITE MY FINGER.
LOOK WHERE ITS POINTING!"

Attributed to Warren McCulloch

"The impression I am left with here is that when we start to get beyond what this subcommittee has done. . . this particular experience at this particular plant, in many ways can rightly be viewed as a Three Mile Island in the construction area." [Hon. Toby Moffett, interrogating Mr. Hugh A. Barker. See p. 31 below for reference.]

"What you are saying, in effect, is that we have not done anything wrong in the past 2 years and we promise never to do it again." Hon. Joel Deckard, interrogating Mr. Hugh A. Barker. [See p. 31, below, for reference.]

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INTRODUCTION

The bald statement of dates and actions cannot adequately convey the fiscal and human costs which have been incurred in the Save-The-Valley/Public Service Indiana-NRC struggle over Marble Hill. It would take a more skillful writer than I to picture the fears and worries of our friends. One thing I can ensure, however, is that it may be made clear that Public Service Indiana (PSI) undertook the Marble Hill adventure in spite of advice, and of warnings about the consequences of such a course of action. Now, as a consequence of ill-advised management failures in the quality-assurance program [see pp. 156ff in Transcript of March 25, 1980 meeting of Madison (Tr-3/15)] the company is in danger (in my opinion) of corporate melt-down.

In this White Paper, Number Sixteen in the Save-The-Valley series, I shall present facts and analysis about what Marble Hill is, including a chronology of events to date (January-February, 1981). Where it seems desirable for reasons of interpretations, I offer clearly marked opinions; views about the costs of the Marble Hill adventure.

In this way the Reader may be in the best position to form his own opinion of this whole (in my opinion, miserable and evil) affair.

It is essential that the people of this region let their voices be heard loud and clear in opposition to Marble Hill. If we do not act we shall be saddled with a \$4.5+ billion plant run by a management whose record for mismanagement is already expensively demonstrated (pp. 4-20) and who must be censured.

If we do not act we shall see 100% rate increase over the next few years, especially if we allow CWIP in the rate base.

If we do not act we can expect to be exploited in the fictitious name of need for electrical energy (pp. 28-30).

LET US ACT! PLEASE SUPPORT SAVE-THE-VALLEY.

WHAT IS "MARBLE HILL"?

In late 1840 an enterprising gentleman named Hiram Dean, interested in the stone out-cropping along the Ohio River above Bethlehem, Indiana, found marble. It appeared to be of good quality--some of the stone is now part of the Madison courthouse --and by 1850 a quarry was in full swing.

But by 1856 the vein of quality marble ran out. The colony of some fifty families who lived by it were out of work. They gradually dispersed to other jobs, so that in a few years nothing was left of the little community, or to Mr. Dean's venture.

Dean then turned to raising peaches. By the late '80s he and his four sons controlled plantings of some 125,000 trees along three miles of the River bluff on the Indiana side, and land across in Kentucky. Then came 1896, and another disaster. With peaches at 25¢ a bushel (it cost 35¢ to pick them) and wheat at 40¢ farmers couldn't meet the bills they owed to the huge Dean store, and collapse followed. [From Chas. E. Heberhart, "They Say and Do in the Country," Madison Courier, 11/7/38, with thanks to Professor Frank Baker of Hanover.]

A third, possibly as ill-starred, venture is in progress at Marble Hill. Public Service Indiana [PSI] has been authorized by the U. S. Nuclear Regulatory Commission [NRC] to construct two pressurized water nuclear reactors designed to operate at core power levels of 3411 megawatts thermal each, to be known as Marble Hill Nuclear Generating Station, Units 1 and 2 [Marble Hill].

ANALYSIS OF THE MARBLE HILL CAPER

1. If Marble Hill construction is completed, and
If the plant is permitted to operate,
Then it will generate radioactive atoms ("radioactivity")
 - a) Radioactivity will be continuously released to land, air and water. [The release systems are designed to produce effluents of radioactive materials "as low as is reasonably achievable." Design is one thing, actual behavior another, and there are, nationwide, frequent "unplanned" releases of radioactivity which raise questions whether the designers know enough. Besides there is no lower limit below which nuclear radiation is not a menace to health--except zero.]
 - 1) Radioactivity released to land will find its way to the water table.
 - 2) That released to air will travel as a plume. Madison, Hanover, Milton are close by down-wind some of the time. Jeffersonville, Clarksville, New Albany and Louisville are down-wind some of the time.
 - 3) That released to water will travel in the Ohio River to the water supplies of down-river towns.
2. Construction at Marble Hill
 - a) Requires N-certification
 - b) Has meticulous and extraordinary quality requirements.
 - c) Is extremely costly
3. The possibility of accident is recognized by the NRC requirement that evacuation plans be in place before the plant can be started up.

PLAINLY, leaving out further disadvantages, the customers of PSI are asked to pay for the construction and financing of this expensive Nuke, and at the same time pay for evacuation plans so we can run for our lives from it. (Cost/Benefit bottom line.)

SAFETY-RELATED STRUCTURAL DEFICIENCIES AT MARBLE HILL, I.

An account of the public discovery of the shoddy and unsafe work going on in safety-related structures at Marble Hill must be given at several levels. I shall take up the affidavits courageously given to Save The Valley by Mr. Charles Edward Cutshall and three other concrete workers at Marble Hill. Then I shall excerpt from the newspaper reports that followed when the matter was made public (perhaps the reader will have enough information to draw conclusions about the integrity and the credibility of the protagonists).

My account begins with a long article from the Madison Courier of May 4, 1979. "Hugh A. Barker, president of Public Service Indiana, was the guest speaker at last night's Madison Rotary Club meeting.

"Barker talked about Marble Hill nuclear power plant being built near Madison by PS and what the accident at the Three Mile Island nuclear plant in Harrisburg, Pa., will mean to it. . . ."

Barker spoke of a four-member "Marble Hill Review Task Group whose job is to examine Marble Hill's design and, if necessary, recommend changes. We will continue with Marble Hill," he said, "only as long as we are satisfied that the operation of that facility will place no undue risk to members of the public or to plant personnel." He gave no hint of problems at the construction site (but see pp. 9ff of this series).

On May 8 Mr. Cutshall made an affidavit before a Notary Public who took the sworn statement down in shorthand and on a tape recorder, later transcribing it in the form presented as testimony to the congressional sub-committee of the Committee on Government Operations, House of Representatives, November 27 and 28. This Committee was chaired by Hon. Toby Moffett. The transcript is referred to as Tr-HR.

STRUCTURAL DEFICIENCIES, II. CUTSHALL TESTIMONY.

Mr. Cutshall said, in answer to questions from Mr. Robert Gray, of Save The Valley:

- A. I've been around concrete work all my life; my father's been a finisher for close to 50 years. I am familiar with concrete work. [p. 3]
- A. I'm concerned about the conditions of the concrete and things I have seen on the Marble Hill construction site, pertaining to honeycomb patches. . . . [p. 4]
- A. If a form is, say for instance, four (4) feet thick--or the concrete would be a four (4) feet thick wall and has a honeycomb on the side, it might go in as much as two (2) or three (3) feet into it and have the air pocket to where a concrete is loose. You can just beat it out with a hammer, and in some cases it'll fall out on its own--just breaking it with your hand.
- Q. Thus leaving it much more narrow than the specifications call for?
- A. Yes, sir.
- Q. Okay, and you've seen this at Marble Hill?
- A. Yes sir. It is one of my jobs to patch these--to supply materials for the finishers to patch these areas. . . . [p. 4]

Mr. Cutshall said that he had worked in and outside of the containment vessels and steam tunnels, and that honeycombs were present in all. In one steam tunnel water was leaking in at 5 to 20 gallons an hour due to the poor concrete work [p. 6]. The contractor's supervisor or superintendent, and PSI officials on many occasions said to patch over the honeycomb without proper repair before the NRC inspector can see it [p. 7]. "Before the inspectors can get around, they'll have them just more or less mask over, cover up, the areas before the inspector can see it." [p. 8]

Mr. Cutshall said further, on questioning, that he had seen an NRC inspector about three times in 2 months. The supervisors received notice before they can even come on site and then not without a PSI escort [pp. 11-12]. He said that he had seen honeycombs "a foot or better" deep, and irregular shapes up to 4 feet in diameter [p. 19]. He had the impression that the NRC inspectors were pretty sharp--but that they couldn't see everything in their limited visits [p. 20]. He himself was concerned "because I believe that such things that I've explained will definitely affect the workability of the nuclear power plant."

- Q. Would it be reasonable to sum up then that you think that the quality is below standards at Marble Hill?
- A. Yes sir. [p. 21]

These excerpts are from the sworn statement of Mr. Cutshall inserted in the transcript of the Hearing Tr-HR.

STRUCTURAL DEFICIENCIES, III. ROGERS AFFIDAVIT.

I, Jewel W. Rogers, of legal age and being duly sworn, state:

1. That I worked at Marble Hill as a concrete finisher's helper for Gus Newberg Construction Company out of Local 795, Laborer's Local.
2. That I worked at Marble Hill from March 1979, through May 18, 1979.
3. That I have personally in my capacity as a concrete finisher's helper at Marble Hill been present when one Newberg superintendent over concrete finishers and their helpers, directed concrete finishers to cosmetically cover honeycombs before the honeycombs were to be inspected.
4. That I worked along with Charles Cutshall at Marble Hill.
5. That I am personally aware that Newberg Construction is using unskilled and untrained union laborers in and around the concrete pours and finishing.
6. That I am personally aware of the speed in which Marble Hill is being constructed; that such speed in building is causing unsafe working conditions and improperly poured concrete; that when I complained to my union about this speed and concerning lack of proper gear in which to pour and finish concrete, I promptly was laid off from my employment.
7. That I have worked in and around concrete for the past twenty (20) years or so.

Signed by Jewell W. Rogers
07/07/79.

STRUCTURAL DEFICIENCIES, IV. WALSTON AFFIDAVIT.

I, Michael L. Walston, of legal age, and being duly sworn, state:

- 1. That I was employed as a concrete finisher working directly under Local 821 of Cement Masons from February, 1979 until the latter part of June, 1979.
- 2. That I have six (6) years experience working ⁱⁿ and around concrete.
- 3. That my foreman, Jim Cutshall, ordered me to cover up honeycombs improperly.
- 4. That I have personally observed concrete being dropped thirty (30) feet, approximately, from the conveyor belt to the pour areas numerous times at the Marble Hill site.
- 5. That I have personally observed pours being made too quickly for the vibrator operators to keep up and properly vibrate the concrete; that this event has occurred quite frequently.
- 6. That, in my opinion, most of the concrete pours upon which I have personally observed have not been properly vibrated.
- 7. That I was personally sent home by a Newberg superintendent while two (2) laborers remained overtime to finish concrete in my area; that the (2) laborers at that time were not concrete finishers.

Signed Michael L. Walston
07/08/79.

STRUCTURAL DEFICIENCIES, V. MORTENSEN AFFIDAVIT.

I, Stanley J. Mortensen, of legal age and being duly sworn, state:

1. That I was employed out of Local 694, of Cement Masons, Louisville, Kentucky, working directly under Local 821 of Cement Masons, Seymour, Indiana, for Newberg Construction Company at Marble Hill, from early March, 1979, through May, 1979.
2. That my specific occupation at Marble Hill was as a concrete finisher (cement mason); that I would be considered a journeyman in the trade.
3. That Steve Gayso, Newberg's superintendent over cement work at Marble Hill, advised this affiant personally to cover up honeycombs cosmetically before the inspectors saw them.
4. That this affiant has personally observed laborers being placed in the capacity of concrete finishers by direction of Steve Gayso.
5. That in my capacity as a concrete finisher, I was personally ordered to cover up a six (6) inch wide and approximately twelve (12) foot wide expansion joint on and around the base of the reactor building, which expansion joint was to be two (2) inches wide, in my understanding; further, the quality control personnel admitted there was a mistake but to cover up the mistake.
6. That I have personally observed testing personnel at Marble Hill testing concrete in a sheltered area while a concrete pour was being made in the steady, heavy rain.
7. That during my term of employment all black concrete finishers sent to Marble Hill were terminated; that, specifically two (2) blacks were terminated after the hiring of two (2) white concrete finishers.
8. That I have personally observed (dead) dry pack used to cover tie holes.
9. That I am appalled with the quality of concrete work at Marble Hill that I have personally observed.
10. That, in my opinion, the union workers of each and every union at Marble Hill, are being directed to construct Marble Hill too quickly; in the process, the quality of work is becoming questionable and approximately four (4) years of wages per union member are being lost.

Signed Stanley Mortensen

07/08/79.

STRUCTURAL DEFICIENCIES, VI. MEDIA REPORTS, 3

The papers most frequently referred to are The Louisville Courier-Journal [CJ], the Madison Courier [MC], The Indianapolis Star [IS].

06/14/79, CJ. "According to an account broadcast last night by Louisville Television station WAVE, the NRC said the Marble Hill construction site contains more than the average number of honey-combed sections of concrete than are usually found in nuclear plant construction."

06/21/79, MC. "The U. S. Nuclear Regulatory Commission says irregularities were found at the Marble Hill construction site in the method used to check welds and seams in liner plates designed to contain radioactive material. . . ." "NRC spokesman Jan Strasma said the agency had turned down a PSI request to send a fulltime inspector to the construction site. . . ." "Strasma said the commission is aware of the non-compliance, but the NRC is waiting for the subcontractor [Sargent and Lundy] to justify the use of the lower standard. . . ."

"'I wouldn't call this a major problem,' Strasma said of the deviation from the NRC standards. . . ." PSI President Hugh A Barker told a news conference at the construction site Tuesday voids are common and to be expected for any large-scale concrete pouring operation However, Barker said all voids are identified and repaired under approved procedures, and he said he is confident NRC inspectors 'will support our assertion that no unsafe or potentially unsafe conditions exist. . . .'" [Emphasis added.]

06/23/79, MC. "NRC investigation specialist James E. Foster told reporters in a news conference yesterday that it was 'not our (NRC) view of the moment' to consider shutting down the facility because of the improper concrete patching. . . ." "Barker said all voids have been repaired according to NRC standards. . . ."

06/27/79, MC. "Concrete work at the Marble Hill construction site . . . has been stopped temporarily until the Nuclear Regulatory Commission is satisfied with its procedures. PSI announced the work stoppage of safety-critical structures today to 'assure that concrete work at its Marble Hill nuclear project would meet highest standards of safety.' The utility estimated work would resume in about a week with NRC approval. The NRC requested the shutdown yesterday and the 160,000 yards of concrete already in place will be reexamined" The Article continued with excerpts from Mr. Cutshall's testimony.

STRUCTURAL DEFICIENCIES, VII. MEDIA REPORTS, 2.

06/27/79, MC. Save The Valley's spokesman, Mr. Robert Gray, stated to the Madison Courier:

". . . . Those of us who have identified what we consider serious generic construction methods are in the ridiculous position of laboriously and expensively identifying and pointing to obvious corrective methods. We are not in the business of helping PSI to build a better mousetrap. Alternately we feel Marble Hill is an imminent and inherent danger to the health and safety of this entire region. STV feels that the NRC is naive in appearing to envision STV as 'in harness' with PSI, contractors, and the NRC to identify and correct defects--but to continue to build. In reality STV feels that we have identified a full justification for construction to stop. And to reevaluate electrical generation priorities for this entire region. The cement defects and weld finer substandard procedure identified by the NRC are in our opinion merely symptomatic. STV does not feel that we should stand as watchdog for apparent NRC laxity and to identify apparent contractor and utility corner-cutting and questionable safety-related construction practices. STV feels that the Marble Hill plant is inherently unsafe and unhealthy for all of us in this region."

06/28/79, MC. "Public Service Indiana and the Nuclear Regulatory Commission have found 170 patched hor ycombs [of 517 so far detected] at the utility's nuclear plant site at Marble Hill that are suspect. And an NRC official is questioning all the concrete that has been poured at the nuclear power plant construction site 'There is a question in our minds as to how good the concrete is in the total structure,' James Keppler, director of the Region III NRC office in Chicago, said. . . . Keppler said it is too early to determine if there was an intentional effort to cover up the repair problems. An NRC spokesman in Chicago, Jan Strasma, added: 'There is some significance to the problem, particularly if it was done as a coverup'. . . . PSI estimated that it will be a week before full construction resumes."

06/29/79, MC. "In other developments regarding PSI's nuclear power plant, U. S. Rep. Joel Deckard, R-Ind., has called for a congressional investigation of the plant. . . . PSI president Barker was quick to reply to Deckard's charges. 'We would be shocked and totally surprised if the Nuclear Regulatory Commission has made such a statement since they have closely monitored the Marble Hill project from its start,' Barker said."

STRUCTURAL DEFICIENCIES, VIII. MEDIA REPORTS, 3.

06/30/79, CJ. Mr. Byron Himmelheber, a spokesman for The Paddlewheel Alliance "said PSI is treating the construction problems as 'a question of public relations rather than the safety of the people of Southern Indiana.'" Replying to a comment by congressman H. Joel Deckard, Jan Strasma, NRC media representative in Chicago said, "'There has never been an instance when a construction permit was revoked," "You have to be talking about very severe problems regarding the health and safety of the public or a total lack of confidence in the utility's ability to safely construct the plant."

07/04/79, IS. Jan Strasma (NRC) says that the pace of work under "fixed-price contracts" with no provisions for paying cost overruns may have contributed to poor concrete work. NRC has ordered PSI to stop pouring concrete in safety-related structures.

07/07/79, MC. The NRC "postponed a decision on giving the green light for resumption of construction work" by PSI.

07/10/79, MC. STV told MC that it has several sworn statements about situations that could affect health and safety. James Keppler, regional NRC director based in Chicago said that "Everything Cutshall has said so far has turned out to be true. . . ."

07/12/79, CJ. "The president of the utility building the Marble Hill nuclear power plant acknowledged yesterday that there had been serious concrete-pouring problems at the plant, but denied any cover-up." He said that the workers should report any problems to their supervisors, or if necessary to the NRC. "We want them to know . . . that the proper place for them to go is to the NRC, not to some group whose motives are quite different and well known."

07/12/79, MC. "Marble Hill is 'not shoddy construction,' according to PSI president Hugh A. Barker." This is what Barker told a group of Madison community leaders. He urged the group to look at STV's ". . . underlying motives. They are not interested in safety; their objective is to put a stop to Marble Hill and all power plants."

07/13/79, CJ. "A House subcommittee will investigate alleged construction irregularities at the Marble Hill nuclear plant, Indiana Representative H. Joel Deckard, R-Evansville, announced yesterday. In a related development, Sen. Wendell F. Ford, D-Ky., threatened to bring the same issue before a hearing of the Senate Energy Committee. . . ."

STRUCTURAL DEFICIENCIES, IX. MEDIA REPORTS, 4.

07/13/79, CJ. Editorial.

"PSI President Hugh A. Barker now acknowledges that the problems at Marble Hill have been more than routine, as he earlier characterized them. . . . The vice president of Newberg Construction Company, which is performing work on the site, says concrete pourer Cutshall may have been 'planted' on the job by Marble Hill opponents. A more loyal worker, presumably, wouldn't have blabbed. . . .

"But if Charles Cutshall hadn't blown the whistle, it seems clear that the last barrier against an accident capable of laying waste much of Kentucky and Southern Indiana could have been fatally defective. And another 'China Syndrome' enterprise, run by people with eyes for only the profit-and-loss statement, would have been an obvious possibility."

07/17/79, MC. "Concrete work on the containment and auxiliary buildings [at Marble Hill] was halted for 12 days in late June and early this month after NRC inspectors said 170 air pockets, one of them 15 feet long, had been improperly repaired. The NRC still is investigating Cutshall's charges that the improper repairs were intended to conceal the defects. . . . "

07/19/79, MC. "Corps of Engineers will check concrete. . . . The NRC has four inspectors at the Marble Hill site along the Ohio River. They are watching concrete pours, conducting tests of previously poured concrete and investigating allegations concrete faults in the reactor building were concealed. Four former workers have charged that officials of Newberg Construction Co. and Public Service Indiana, which is financing the plant, ordered the cover up. The companies have denied the charges. [See part II of this Section.]

STRUCTURAL DEFICIENCIES, X. MEDIAL REPORTS, 5.

07/22/79, IS. Reporting on two damaging construction incidents, the Indianapolis Star wrote:

"In the second case, concrete was poured for the containment liner at a rate of 10 feet in 70 minutes--three times the NRC-specified rate of 3 to 3½ feet per hour. The wooden forms buckled and cracked, and the steel liner may have been deformed.

"Sargent & Lundy examined the damage on February 22, nine days after the incident, but PSI's safety committee was not informed until April 10. When the NRC inspected the site April 30 through May 3, PSI still had not notified the federal agency.

"Telephone notification was made June 1, and in a letter written June 29, PSI Vice-President--Nuclear, James Coughlin stated: 'PSI has not determined whether this incident is reportable as a significant deficiency.'

"But NRC regulations specify that the plant licensee--in this case PSI--must notify the federal agency within 24 hours of discovering 'a significant deficiency in construction of or significant damage to a structure, system or component which will require extensive evaluation, extensive redesign or extensive repair.'

"This 24-hour period starts when the licensee or his agents first finds the deficiency,' the report said.

"Although Newberg's deficiencies have caused many of the problems at the plant, PSI is responsible for its contractors' work, and the NRC has made it clear that the utility will be held responsible.

"Thomas M. Dattilo, the Madison attorney who represents Save The Valley, which opposes the plant, charged that the breakdown in quality control at Marble Hill 'shows that PSI is not capable of constructing a nuclear power plant.

"Either PSI knew about Newberg's lack of quality control, or they aren't capable of supervising the construction. In either case, I believe their construction permit should be revoked,' Dattilo said."

STRUCTURAL DEFICIENCIES, XI. MEDIA REPORTS, 6.

07/25/79, MC. The Corps of Engineers say "We've been invited by the NRC to look at the U. S. Testing laboratory and concrete. We don't normally go to all the nuclear sites, but are working at a few others on different problems."

07/26/79, MC. "More Nuclear Regulatory Commission inspectors are coming to Marble Hill nuclear plant being built near here as part of a special investigation over construction troubles plaguing the project, the agency announced yesterday.

"The action came after results of a June inspection by the National Board of Boiler and Pressure Vessel Inspectors were announced this week. The group concluded after inspections June 12-14 that Public Service Indiana building the Ohio River plant lacks proper certification to construct the plant and that it has not properly documented the safety of some critical equipment."

07/26/79, IS. "The five or six-man team will probe a wide variety of code violations and construction flaws, 'ranging far beyond the concrete problems' which the NRC has focused on for the last several months, spokesman Jan Strasma said. The new investigation could lead the NRC to order a complete halt to work on the power plant, Strasma said.

"But we believe that if the NRC stays within its charter, as it defines it they'll never find anything," Dattilo said, 'They feel they cannot go beyond judging procedures in safety-related work, and the problems at Marble Hill go far beyond that.'

"NRC keeps looking at the single trees, and that approach will lead to a dead end," Dattilo said, 'Our small organization has been able to provide them with information they never would have developed, even if they stayed on the case five years.'

"The Marble Hill problems 'lie in many, many union and management problems, in contracts and contractor relationships,' Dattilo said. The NRC has ruled many of these areas outside its charter as a regulator of nuclear plants.

"Meanwhile Floyd County Prosecutor Stephen Beardsley said detectives are investigating a report that a member of Laborers Union Local 795 threatened to shoot Jewel Rogers. . . . one of four former Marble Hill workers who gave Save The Valley affidavits alleging the concrete cover-up. Beardsley said the threat to Roger's life 'presents a case of intimidation in its clearest form.'"

STRUCTURAL DEFICIENCIES, XII. MEDIA REPORTS, 7.

07/28/79, MC. "The Department of Justice has been asked to join the investigation of construction practices at the Marble Hill nuclear plant to determine if any federal laws [e.g. in relation to the alleged cover-ups of concrete flaws] have been violated, an official says."

07/31/79, MC. "John Blair, editor of the Ohio Valley Environment newspaper. . . said he feared that southern Indiana could become 'a nuclear jungle,' producing energy for the rest of the nation. . . .

"Mary Clashman of 'Save the Valley,' . . . also complained about Marble Hill's location, saying that if there were a nuclear accident, it would be virtually impossible to evacuate the 13,000 residents of Madison because of the road system in the area."

08/01/79, Lafayette (Ind.) Journal & Courier. "Nuclear power opponents have urged a special legislative committee to recommend laws limiting the chances of any nuclear power plants beginning service in Indiana, including the two presently under construction."

08/02/79, MC. "State inspector will check Marble Hill pipes, fixtures." "But an ASME staff engineer, Arlene Spadafino, said the state's effort 'doesn't even address what we're interested in.' The ASME Nuclear Certification Committee 'won't accept anyone else's report without checking it out ourselves,' she said."

08/03/79, MC. "'We would have to consider very seriously whether we could allow construction to continue (if) there had been cover-up by the utility,' said Jan Strasma, an NRC spokesman in Chicago.

"Meanwhile, concrete pouring for structures that might leak radiation during a nuclear accident has been halted for the second time. The first stoppage was for defective concrete work, the current one for allegedly failing to take sufficient precautions to prevent defects. . . ."

08/04/79, CJ. "The executives of Public Service Indiana should be ready, if they're not, to bewail the day the slick salesmen of the nuclear industry turned them from the relative certainties of coal-fired power to the awesome imponderables of nuclear generation The case for constructing a billion-dollar-plus nuclear plant in a region with easy access to coal and good transportation never was convincing. . . . But if PSI can't even get concrete poured to exacting standards a layman may well wonder how it will perform when faced with the far more difficult tasks of building and operating the actual generating and safety systems. . . . But an even better question is whether PSI and its customers and neighbors wouldn't all be better off if the utility cut its losses right now and abandoned a project that was ill-advised in the first place."

STRUCTURAL DEFICIENCIES, XIII. MEDIA REPORTS, 8

08/06/79, MC. "At least one new area of poorly packed concrete has been found through testing at the Marble Hill nuclear plant site, a spokesman for the Nuclear Regulatory Commission said. . . . Construction in areas that could leak radiation is currently at a standstill at the NRC's, request."

08/08/79, CJ. "The Nuclear Regulatory Commission is considering a formal order that would require Public Service Indiana to prove that deficiencies at the Marble Hill nuclearpower plant have been corrected before construction can resume in safety-critical areas of the plant. . . . 'Because the problems at the site have continued, we're considering a formal tool. An order has legal force,' Strasma said. . . . Barker said the steps he outlined should solve problems that were found by commission inspectors. 'We've acted with the pressure of the commission behind us,' Barker said. . . . Barker said it would cost an additional \$12 million each month that construction is delayed. The cost would be passed to the consumer, he said. Additional costs from anticipated delays are not considered 'significant,' Barker said."

08/16/79, MC. "The Nuclear Regulatory Commission (NRC) yesterday issued an order confirming the work stoppage on all safety-related areas at the nuclear plant construction site. The order also provided the opportunity for any person whose interest may be affected by the order to request a hearing within 20 days of the issue date of the order."

"Mr. Thomas M. Dattilo said he would request a hearing. STV needs to know what NRC intends to do with the defective concrete, why it was not detected earlier. He pointed out that during the pre-construction hearings, 'We attempted to question (PSI President Hugh) Barker, who was hustled out of the hearings because, he said, he had to go to Washington for a meeting'"

08/16/79, CJ. "Bart Grabow, vice president of public relations for Public Service Indiana, told members of the Bluegrass chapter of the Public Relations Society of America yesterday in Louisville that continued media attention to the plant's problems has damaged public confidence in the project 'far in excess of the merits of the case. . . .'"

"Once those problems surfaced, he added, the ongoing situation became much like the one officials faced at Three Mile Island.

"'Every day brought its new crises. There was no way to gain control of the sources of information.'" [Emphasis added] This would seem to be a fair statement of PSI's attitude as observed from outside.

STRUCTURAL DEFICIENCIES, XIV. MEDIA REPORTS, 9.

08/17/79, CJ. "Kentucky Atty. Gen. Robert Stephens said yesterday he will decide within a week to 10 days whether to ask for a public hearing. (See previous page.) . . . He noted the state involved in a federal court appeal of the construction permit granted Public Service Indiana by the Nuclear Regulatory Commission. And he noted his office has been actively pursuing a boundary dispute with the states of Ohio and Indiana."

08/22/79, Hard Times Newspaper. John Flynn, Staff writer: "Hard Times has learned from informed sources that a former cement inspector at Marble Hill alleges that one of his inspection reports was falsified, with his name assigned to it."

"He alleges that his initial report indicated a failure of the cement batch, but was changed to show that it had passed. His other charges in a long transcript include allegations that: Cement samples were placed on ice for environmental control. Cement was poured in driving rains. Curing temperatures for cement were recorded on days when no one was present. He was instructed by U. S. Testing to wait for a 'good batch' of cement before sampling it. None of the Nuclear Regulatory Commission inspections came as a surprise. . . ."

08/29/79, CJ. "Attorney General Robert Stephens said yesterday he will not seek a public hearing on an order that stopped safety-related construction on the Marble Hill Nuclear Power Plant in Southern Indiana. However, he said, if another party seeks such a hearing, 'we wish to participate as an interested state.'"

HEADLINES

08/27/79, CJ. "U. S. Attorney, FBI joining Marble Hill investigation."

09/19/79, MC. "Marble Hill deficiencies found before construction" (NRC "twice found deficiencies in plans for supervising construction . . . before work began. . . .")

11/23/79, MC. "Marble Hill construction advisers named" (Management Analysis Corporation [MAC] of San Diego)

02/08/80, MC. "PSI discovers some pipe supports may be faulty."

02/09/80, CJ. "Some pipe supports at Marble Hill may have to be removed, PSI says."

02/14/80, MC. "PSI receives authorization from ASME."

02/14/80, IS. "Marble Hill Gets ASME OK To Start Building Piping System." (PSI "has received temporary approval. . . to construct piping systems at Marble Hill. . . .")

07/08/80, MC. "PSI gets approval to receive, inspect safety-related material." ("It should be noted that yesterday's NRC action authorized only a resumption of inspecting materials which will be used in safety-related areas of the plant. . . ." said "S. W. Shields, PSI senior vice president--nuclear division.")

11/15/80, CJ. "NRC says improper repairs were ordered at Marble Hill." (But the U. S. attorney's office in Indianapolis said no criminal indictments would be returned.)

12/06/80, MC. "Limited piping, electrical work okayed at Marble Hill."

INSPECTIONS OF PSI'S MARBLE HILL WORK, I.

The NRC, Region III (Chicago) issued a report dated May 29, 1979, of inspection conducted by Messrs. E. J. Gallagher, F. C. Hawkins, and J. F. Suermann, at the Marble Hill Nuclear Station. The covering letter to PSI by the writer James G. Keppler said, among other things:

During this inspection, certain of your activities appeared to be in noncompliance with NRC requirements, as described in the enclosed Appendix A. . . .

Items No. 2 and 4 shown in the Notice of Violation enclosed with this letter are recurrent items and warrant your personal attention to preclude further recurrence. . . .

. . . we are concerned with the lack of effectiveness of your quality assurance program for construction activities of Marble Hill

Appendix A is entitled Notice of Violation, and has four sections. The first is said to be a deficiency and the remainder to be infractions. I excerpt from all four, with comments. In each case Appendix A cites the relevant NRC regulations, whence the phrase "Contrary to the above" which recurs.

"1. Contrary to the above, the following two deficiencies were not handled in an expeditious manner." These deficiencies were that certain metal plates had been damaged on February 12, 1979, but not reported to NRC until April 19. In the meantime "Concrete backfill material on the exterior of the containment has been subsequently placed thus not permitting direct inspection of the subject area."

2. Contrary to the above, immediately prior to concrete placement, the NRC inspector observed the following specific conditions adverse to quality which had not been corrected in two concrete pour areas which had been inspected and released for concrete placement by responsible QA/QC [quality assurance/ quality control] personnel.

- a. At least 12 reinforcing steel shear ties which had not been properly secured.
- b. Loose wood pieces, tie wire, duct tape, and other general construction debris.
- c. Standing water.
- d. Embedded wood in a horizontal construction joint within the pour area.
- e. Unacceptable cleanliness of formwork.

INSPECTIONS OF PSI'S MARBLE HILL WORK, (continued) II.

These observations by NRC inspectors lend the strongest validation to the affidavits of the concrete workers, quoted on pages . . . They are shocking evidence of the shoddy construction practices permitted by PSI.

3. Contrary to the above, . . . the inspector, with licensee personnel present, observed that curing of the Unit 1 containment wall 1CW-Ext. 6 was not being performed in accordance with Sargent & Lundy Specifications. . . .

The inspector was unable to verify that adequate corrective action to assure proper curing of containment wall 1CW-Ext. 6 was taken at any time during this inspection.

Item 4 has to do with documentation, which was inadequate and ignored or was ignorant of the relevant requirements.

This whole report is frightening in its implications for the safety of the public. It is an indictment by NRC of PSI management.

The National Board of Boiler and Pressure Vessel Inspectors/Indiana Boiler and Pressure Vessel Board made several site visits to the Marble Hill Station in June, August, September and October, 1979. Below are excerpts from 1) team findings during the June 1-14 visit, and 2) the joint review of documentation of November 12, 1979.

1. A very serious problem encountered by the inspecting team was in the disarray of documentation. All material that goes into a nuclear plant must be carefully inspected and certified correct--the "N" certification. The reason is in part that many metals when subjected to the heavy flux of neutrons from a core become transmuted into other atoms which distort and thus weaken the structure. Further, hydrogen may be produced. In that case, certain metals react with hydrogen to form hydrides--chemical molecules which may lead to embrittlement and further structural weakening. Only properly trained quality control/quality assurance inspectors are licensed to make such inspection and certification. The materials are produced as purchased to specific codes of the American Society of Mechanical Engineers [ASME] and these codes must be kept up-to-date.

INSPECTIONS OF PSI'S MARBLE HILL WORK (continued), III.

1.3.4. It appeared apparent that neither the owner or the subcontractors had the necessary information for determining the specific Code Edition and addendas material was purchased to. Consequently, the proper documentation, receiving procedure, etc., could not be determined by either the subcontractors or the National Board Team.

1.6 Public Service Company of Indiana, Inc., supplies material to their sub-contractors on this site. They do not have a material identification and verification program as required for a material supplier and do not appear to meet any of the requirements of NCA-3800.

1.6.2 Some of the documentation accepted by Public Service Company of Indiana for material to be used in safety related Code construction for this site indicates the material is not acceptable for nuclear Code construction and in addition is not documented as required by NCA-3867.6.

2. Teams made several visits to the Marble Hill site to check on whether their recommendations had been followed. They issued the Joint Review, November 12, 1979 as a text of some 14 pages followed by some 85 pages of exhibits. They listed 12 examples of nonconformances (examples in the exhibits) and added "As previously indicated these nonconformities appear to be generic to all the system documents reviewed and in the interest of brevity, only those examples necessary to illustrate the nonconformities are included." [p. 6].

In the Summation of Findings the Report says,

5.1. PSI was made aware of serious issues involving noncompliance and potential noncompliance with ASME Code requirements regarding material and material certification documents as early as July 14, 1977 by letters from site contractors identifying these problems but has failed to date, to provide comprehensive and responsible corrective action.

HEALTH COSTS, I

When the subject of health risks came up during the Marble Hill hearings on March 11, 1977, the NRC expert, Dr. G. Hoyt Whipple, Professor of radiological health of the University of Michigan said in written testimony [Tr. p. 1601]:

In conclusion, it is my considered opinion that the impact of radioactive releases from Marble Hill on the environment has been adequately and thoroughly evaluated by both the Applicant [PSI] and the Nuclear Regulatory Commission Staff. Any effect produced on human beings and native organisms by the operation of the Station are so small, both in absolute and in relative terms, as to be quite without significance.

He did say, on questioning, that there is no lower limit (except zero) at which radiation is harmless to living cells. Much of his reliance was on the BEIR [Biological Effects of Ionizing Radiation, National Academy of Sciences--National Research Council, November 1972] report.

In the following September (1978) Dr. Karl Z. Morgan, then at the Georgia Institute of Technology, an authority on health physics whose word is seldom disputed by either the nuclear industry or its critics, who had served for some thirty years as director of the Health Physics Division of the Oak Ridge National Laboratory until 1972, wrote, in the Bulletin of the Atomic Scientists [September, 1978, p. 30] on the subject of "Cancer and low level ionizing radiation."

His survey of findings of studies on the effects of low-level radiation are described on the following pages.

Ionizing radiation includes medical X-rays and the radiations from radioactive nuclei. These latter include high-energy X-rays (γ -rays) and nuclear particles fired off at high speed (high energy), including helium nuclei (α -particles) electrons (β -particles) neutrons (penetrating neutral particles about as massive as the nucleus of a hydrogen atom) and assorted other energetic entities.

"Low-level" means that these high-energy entities are released at a slow rate. But they are still high-energy, and capable of doing damage to living creatures.

HEALTH COSTS, II

Ionizing radiation is radiation which can knock electrons out of atoms leaving them charged: ions. In order to understand radiation-dose talk I have to define the units "rad" and "rem". Rad is the name of a unit of "radiation absorbed dose." One rad is a specific amount of energy absorbed by a definite quantity of material. However when radiation penetrates living bodies, different tissues are affected differently. Sex organs and red bone marrow are affected differently. Sex organs and red bone marrow are most sensitive. (Red blood cells and white leucocytes are produced in red bone marrow.) Hands, forearms, feet and ankles are some 15 times less sensitive; single organs are in between.

Because of these differences, and because different types of radiation deliver wallops of different effectiveness another unit called a rem is defined as the rad equivalent man, which produces a standard biological effect. Thus for a number of different radiations absorbed in a body, the total can be added up.

When radiation penetrates the living body it may 1) pass through or near a cell without doing any damage to speak of-- but one rem of one million electron volt gamma rays corresponds to about 2 billion quanta of energy passing through one square centimeter of body surface, and so the likelihood of not doing some damage is small. 2) The radiation may kill the cell or make it unable to divide and grow by destroying some vital molecules. 3) The radiation may damage the cell, but the body repair forces may heal it well enough. 4) The nucleus of the cell, where (in the human being) there reside the 46 chromosomes which code millions of bits of information which control the proper functioning of the cell may be damaged but the cell survives, having lost some vital control functions, so that it multiplies until "in 5 to 70 years" it is diagnosed as malignancy. 5) The damaged chromosomes may survive without loss of the cell's ability to reproduce. If this happens in the sex-organs, the gonads, then the damaged or altered hereditary matter may be transmitted to offspring. The chances are that most such changes are of a lethal nature, but some will be passed on to viable offspring as genetic defects.

With the accumulation in the gene-pool of mankind of hereditary defects, and with the accumulation of radiations from waste products and from releases of radioactive krypton, xenon, iodine and their daughter products cesium, cobalt, strontium; and still others such as plutonium and the other, toxic nuke-made trans-uranium elements, which will continue to radiate us for generations, we are mortgaging the future of humanity and placing a burden on our offspring, unto untold generations, for which they shall curse our memory, and our greed for nuclear money.

HEALTH COSTS, III

In the face of admissions that not enough was known about the effects of radiation on living creatures--man, animals, plants--except that it was known that any ionizing radiation could damage a cell, it seemed unwise to go ahead developing nuclear energy [Tr. following p. 1751]. Two issues are frequently addressed: 1) the health risk from increasing radiation, judged by the number of people who die is far less than that from auto traffic, thus for the good obtained in respect of energy production, the loss of life is acceptable; and 2) is it true that the limits set by NRC rules are strict enough to protect the public.

Issue No. 1 is easily disposed of by the recognition that deaths from automobile traffic are under the decision of individuals--one may choose not to drive. But radiation damage is not under such control for it is foisted on the public indiscriminately and involuntarily and thus is an immoral imposition by the nuclear industry upon the populace.

The second issue is addressed by Dr. Karl Z. Morgan [Bulletin of the Atomic Scientists, 1978, September, p. 30]. In his opinion "The cancer risk from exposure to radiation is much greater than was thought to be the case some years ago." [p. 32]

The problem is complicated because there seems to be an enhancing effect in cancer production by accompanying genetic factors, certain diseases, and such factors as "age, sex, eating and smoking habits and, perhaps, many other individual characteristics. . . ." Dr. Morgan thinks the NRC "allowable" levels are too high but is unwilling to advise excessive reduction for reconomic reasons.

In the neighborhood of a nuclear plant persons may risk cancer to the extent of 0.0003 cancers per man rem (for 1 million of these people, 300 cancers) from an environmental dose of 100 millirem ["milli" means one thousandth] accumulated over a 10 year period. In these circumstances a child with asthma would experience 50 times the risk because of the synergistic effect of the two diseases on each other.

It is no solace to know that natural background radiation is 100 millirem each year. Or, to know that even an unusually clean coal-fuel plant would increase the health risk to 5%, though the primary risk would then become chronic bronchitis and emphysema rather than cancer.

Dr. Morgan emphasizes that far greater than (but not of course minimizing) the risk from radioactive pollutions is the danger of low-level ionizing radiation from medical and dental X-ray exposure as commonly experienced.

DANGERS AND HEALTH COSTS OF NUCLEAR POWER, I.

It might be worth remembering that although the Rasmussen Commission Report (cost, \$3 million) was directed by the Massachusetts Institute of Technology professor, yet it was staffed and largely carried out by AEC personnel.

In the first place the risks are incredibly hard to judge because of lack of information.

In the second place if an accident were to occur--and the chance increases with each new plant built--the results would be catastrophic: thousands dying within two days; tens of thousands developing leukemia and other kinds of cancer over the next 20 years; those of us down-wind of the plant would be especially vulnerable.

Insurance companies do insure us against tornados, although they are not common. On April 1, 1974 most people would have laughed at the possibility of a tornado hitting Madison and Hanover. On April 3, no one laughed; the fact that there hadn't been a tornado here for over a hundred years was no longer relevant. Houses were de-roofed and leveled on all sides.

But insurance companies will not insure against nuclear damage.

There are several important differences between a nuclear accident and accidents such as tornados, earthquakes, fires and other great natural calamities: 1) We can avoid nuclear holocausts by not building nuclear plants; 2) Insurance companies will not insure against nuclear damage, but will against tornado, earthquake and fire; 3) You can't go home again after a nuclear contamination--papers, valuables of all kinds would be unapproachable for at least one generation; the house would be uninhabitable.

John W. Gofman, M.D., Ph.D., who helped isolate the first milligram of plutonium writes [An Irreverent Illustrated View of Nuclear Power, 1979, Committee for Nuclear Responsibility, Main P. O. B. 11207, San Francisco, CA 94101, p. 121]:

To the best of my scientific ability, I have considered the question of whether there is any way that man can live a healthy life with nuclear energy, and I have reached the conclusion that he cannot. The requirements for adequate containment of the radioactive by-products are far beyond any REASONABLE expectation for human endeavor, and the result of failure is an inevitable epidemic of additional cancer deaths, leukemia deaths, and genetic deaths which are going to plague humans for generations, even if the monstrous stupidity, known as nuclear energy were to stop within the next few decades.

DANGERS AND HEALTH COSTS OF NUCLEAR POWER, II.

It seems that the insurance people have been right all along --from their point of view.

The dangers of Nuclear energy are continually becoming more evident. For example, the New York Times of January 13, 1979, reported that Dr. Thomas Mancuso had quit an inquiry into radiation-induced illness at the nuclear submarine base at Kittery, Maine. He said that the Government refused him full access to Navy data.

Dr. Mancuso was one of two M.D.'s who had examined the records of some 13,000 workers at the Hanford, Washington nuclear establishment. They found a significant increase in various forms of cancer among the workers, compared with a group of citizens who had not been exposed.

The Mancusco study, says health physicist Karl Z. Morgan [loc. cit., p. 23], confirmed the earlier findings of Samuel Milham (1974) that cancer risk had increased for radiation workers at the Hanford plutonium facilities.

Morgan writes, as a result of his studies, that cancer risk from exposure to ionizing radiation [cf. p. 22] is a good deal greater than had been thought earlier. He cites work of I. D. J. Bross who found that children who had been X-rayed in utero and who later developed asthma or certain other respiratory illnesses were especially likely to develop leukemia because there appeared to be a synergy between the two types of bodily damage (5000% increased risk).

These and other studies clearly show that low-level radiation is not of negligible danger to the public, as the NRC has been claiming. To the planned release of low levels of radioactive gases and toxic new elements must be added the unplanned releases which hardly ever have been reported.

Since we in Hanover and Madison, Indiana, and Milton, Kentucky, are downwind much of the time from the Marble Hill site we have every reason to wish this construction stopped, for the evidence seems strongly to tell us that we will all be at risk of contracting cancer from the continuous radioactive effluents from the plant if it were to go into operation.

We can therefore applaud the statements of the Paddlewheelers in their opposition to the Marble Hill plant of Public Service Indiana [pp. 40-42].

COSTS OF JOBS

At the Marble Hill Hearing, March 9, 1977 [Transcript, beginning at p. 1004] Colleen Comerford, of Sargent & Lundy Engineers, said:

According to projections, there will be a 3-year period during which the construction force will number around 2,000 people, reaching a peak of approximately 2,200 people. After construction is completed, an operating force of 155 people will remain. . . .

In other words, a plant costing as a minimum 4.5 billion will provide jobs for about 3 years for a maximum of 2,200 people, or an expenditure of over \$2 million per job. Then over some 27 years of operation about 155 jobs at a cost of \$29 million per job. This is what is meant by "capital intensive industry." For comparison Robus Products Corporation of Madison, Indiana, is planning expansion to cost \$3 to \$5 million, with an increase of 75 jobs [Madison Courier 01/26/81]. This amounts to around \$67 thousand per job, maximum estimated, or less than one four-hundredths that of the nuke.

Little of the specialized labor on the nuke can come from this area. On the other hand in Madison and surrounding towns and country there is plenty of need for carpenters, painters, plumbers with imagination and willingness to work at small jobs--home and farm repairs, for example. This kind of individual enterprise, labor intensive would be good for everyone in the area, essentially non-polluting and nonhazardous. Possibilities of other jobs abound.

To attempt to justify as job-producing, construction of unneeded Marble Hill at \$417,000 per man-year of job [2,200 x 3 + 150 x 27, divided into \$4500,000,000, equals \$417,246 per man-year] would seem pure sophistry. It underlines a ripoff of PSI customers by those who stand to gain by selling heavy equipment, by handling the money and financing it, and by planning and supervising the construction.

A study of U. S. Census figures [Statistical Abstracts, U. S. Census, 1971] reveals that electric power required an investment (at that time) of \$224,000 per employee compared with some 30,000 per employee for general manufacturing, reports Richard Morgan. [Nuclear Power: The Bargain We Can't Afford. Environmental Action Foundation, 1977, p.74.] The disparity for nuclear plants is greater than for the electrical industry as a whole.

The tremendous amounts of capital that utilities need to finance nukes drains money away from job-producing, labor-intensive industries. [Energy Policy Project of the Ford Foundation, A Time to Choose: America's Energy Future. Cambridge, Mass., Ballinger Publishing Co., 1974. Appendix F, p. 493.]

GROWTH

In a memorandum to ORBES I wrote:

To reject a new power plant on the ground that it is not needed is to be tagged an exponent of "no growth." [See p. 26.] The issue is so heavily loaded with emotion that it becomes a major challenge to obtain a hearing for someone who would ask whether growth in one direction might not profitably be replaced by growth in another. For example, the mental and physical energies released by not building an unneeded plant may find profitable constructive growth in an area of imaginative, improved services and increased efficiency [see p. 26]. (In addition enormous capital is released, p. 26.)

"Growth" is a multiordinal word: it has meanings that depend on the context in which it is used. There is, for example, a great deal of evidence that growth of Gross National Product (goods and services) is not tightly linked to increase in energy use. Growth may be a healing process, as when a wounded body is returned to normal. Growth may be cancerous when the body's control is lost. Growth may involve irrevocable loss of natural resources, as when oil or coal are burned. Growth may occur in the use of recyclable materials as in the burning of paper, or wood, or alcohol made from agricultural products. "Growth" may be the last refuge of an exploiter (to paraphrase Dr. Johnson).

A tragic result of misconceived demands for material "Growth" is in the exploitation of non-renewable resources. We are using up a priceless heritage from past ages. At the fearful rate of this exploitation it is as though we gave no thought to the needs of succeeding generations. It is only where it helps us develop renewable resources that such profligacy will become justifiable in the eyes of posterity.

Growth in conservation, growth in services that improve life quality, and growth in moral and spiritual stature must be the goals of good stewards of this Earthly spaceship.

ON THE MATTER OF NEED

The matter of need for a power plant is complicated by the prevalence of and indeed necessity for considering, trade-offs. However, given empirical facts such as we try to offer throughout this White Paper (as distinct from the "facts" of utility public relations blurbs), some firm conclusions can be reached.

Over the years Save The Valley has repeatedly pointed to increasing overcapacity of area public utilities. The report on subsidies (pages 34-38 above) suggests some incentives for building in excess of need. In October 1980 we reported that PSI currently has 5716 megawatts of connected generating capacity. There is 695 megawatts more of coal-fired capacity due on line from Gibson Station #5 by 1983. Total 40-year retirements will be 4 small units amounting to only 244 megawatts by 1991.

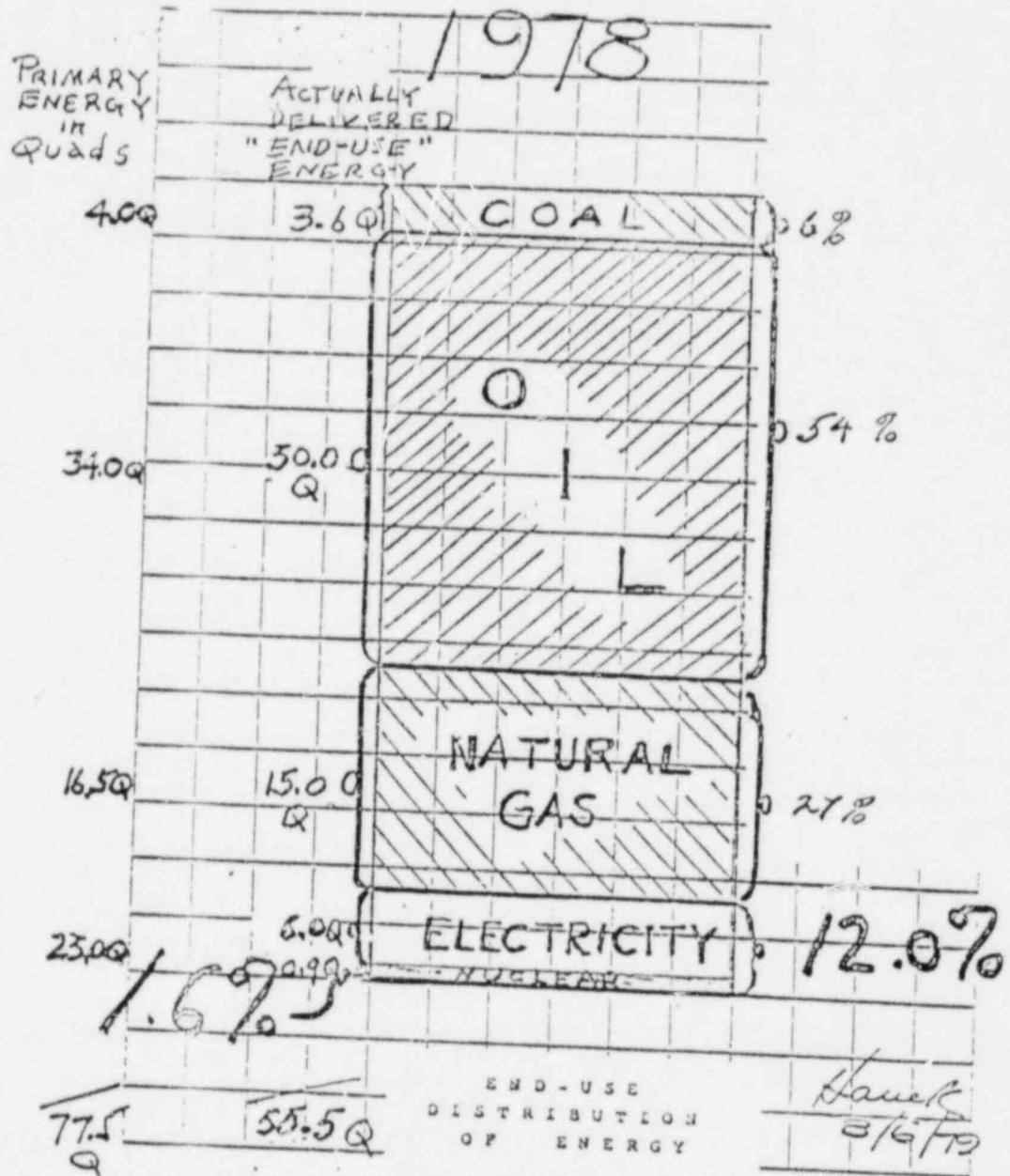
Using these figures (all of them are taken from PSI's last annual report and confirmed by the Federal Energy Regulatory Commission), we find that PSI currently has a 33% reserve ratio.

The national figure for reserve capacity is now 43%. "Standard" is only 17% to 20%, less than half actual total reserves! It's easy to check this figure because it's taken from a long article called, "30th ANNUAL ELECTRICAL INDUSTRY FORECAST" in the 9/15/79 "Electrical World," the mouthpiece of the industry. This 43% number means that all the electric utilities in this country could generate 43% more energy than they generated at the sum of all of last year's 1-hour peaks.

Please note that Indiana Gas Company is rapidly removing the possibility of PSI's winter heating load growth. Both because of price and because of rapidly growing supplies, Indiana Gas has recently added more than 17,000 new customers. The 36" gas main soon to come to Dwight, Illinois, just 50 miles from the Indiana border, will furnish the energy of 22,500 megawatts of electrical capacity, equivalent to 10 Marble Hills.

Public Service of Indiana will conserve several billions of dollars of very scarce and very expensive capital if construction were to be stopped immediately, and resumed only when and if need actually develops. Marble Hill's 2260 megawatts of capacity can't possibly be needed before the year 2000!

The Whole Energy Picture



Reading down on this chart: Coal represents non-electricity-generation use. This provides 6% of energy that appears at end-use-on the job. Oil is the largest energy supplier, mostly for transportation. Natural gas is used mostly for heating and manufacturing. Electricity comprises only 12% of end-use, but uses up 3 times its end-use value in the production process. Finally, nuclear energy provides only 1.6% end-use energy. If it doubles to 2000 it will still be relatively tiny in production while becoming increasingly gross in cost.

END-USE ENERGY

(End-use energy is defined as the amount of energy that arrives at the point-of-use.)

A NEW CONCEPT FOR SHOWING THE RELATIVE IMPORTANCE OF ENERGY FORMS

This is a different (and we think a better) way to show the relative importance of each energy form. (Refer to previous page.)

In the past, relative energy use was portrayed as the amount of primary fuels (coal, oil, natural gas and uranium) consumed. (See left-hand column of numbers "Primary Energy in Quads." One Quad = 10^{15} BTU.) This method grossly exaggerated the importance of electricity to the fuel mix. For example, to generate electricity, we required:

FOR 1978 (ACTUAL)		
Quads of Primary Fuels Used To Generate Electricity	This is This Percent of All Primary Fuels Consumed	Which is This Percent of Total Energy At Point-of-Use
23 quads (Of 1978's 77½ Quad Total)	30%	12½% (Of 55½ Quads total Delivered in 1978)

ELECTRICITY'S IMPORTANCE IN THE ENERGY MIX

To illustrate the miniscule role played by nuclear energy, the 1978 percentage was only 1.6% of total end-use energy. By 1990, this percentage may double, but even then it will be less than 3½% of total energy consumed at the end-use point!

Most people seem to think mistakenly that electricity furnishes most of our energy, and that nuclear power is the main source for the future. This is clearly not so especially since alternative sources of energy (sun, wind, geothermal) are coming into use.

Is it worth mortgaging the future of humankind to "enjoy" 2% to 3% of our total energy?

Based on data from Fred Hauck

With Permission.

WHO PAYS? I

Public Service Indiana [PSI] is a monopoly which is required by law to render adequate service in its field at reasonable price to all who apply for it [the definition of "public utility"]. Its rates and standards are established by law under regulation by the Public Service Commission.

To set a context for following discussion I now turn to the Transcript Construction Problems at Marble Hill Nuclear Facility Nuclear Regulatory Commission Oversight. [Hearings before a Subcommittee of the Committee on Government Operations, House of Representatives. Ninety-sixth Congress, First Session, November 27 and 28, 1979. U. S. Government Printing Office, Washington, 1980 (55-7070)] [Tr-HR]. STV was represented at this hearing, but we were not allowed to testify.

Mr. Hugh A. Barker, president of PSI is being questioned by Congressman Lee H. Hamilton about the cost of delay during the period in which safety-related construction has been stopped by the Nuclear Regulatory Commission [NRC].

MR. HAMILTON: Who will absorb the losses caused by the delay? . . . You understand, I am sure, about the extra costs and mistakes in management. . . .

MR. BARKER. I do not think that question can be answered satisfactorily. I think there will be some negotiation and some of these specific costs, probably with the contractors.

In the end, however, that determination will have to be made at the time that the cost of the plans are considered as part of the rate base of the company. It will have to be considered as a package.

MR. HAMILTON. In the end, then, the consumer will have to bear the costs?

MR. BARKER. No, I would not reach that conclusion automatically.

MR. HAMILTON. What is the other possibility?

MR. BARKER. The other possibility is that the investors would have to pick up part of it. That will result if a portion of the cost were not allowed, as part of the rate base of the company.

However, there will be more delays. Nuclear construction has shown a history that has been one of many, many delays. [pp. 284, 285.]

The Reader should draw his own conclusion.

WHO PAYS? II. HOW MUCH? 1.

That someone pays follows from an old and completely validated adage: no material thing is ever free. On the previous page I offered some hints about who will pay for Marble Hill. Now I inquire from our expert, engineer Mr. Fred Hauck, "How much?" Here is half of his reply:

Three other nuclear generating facilities that are scheduled for completion between 1984 and 1990 have a currently estimated average cost of \$2020 per kilowatt of capacity. Here are the individual figures:

FACILITY	CURRENTLY ESTIMATED COST	COST PER KILOWATT OF CAPACITY	
2130 mw Philadelphia Electric's Limerick Plant (Pennsylvania)	\$3.9 billion	\$1831/kw	
1264 mw Consumers Power Midland Plant (Michigan)	\$3.1 billion	\$2452	
2300 mw Long Island Lighting's Jamesport Plant (New York)	\$4.5 billion	\$1956/kw	
TOTALS	5694 mw	\$11.5 billion	\$2020/kw*

*Therefore Marble Hill's figures are likely to be at least the following:

2260 mw	\$4.56 billion	\$2020/kw
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To be sure that we remember PSI's past history on Marble Hill cost increases, here are PSI's public estimates:

At NRC hearings	in 1976	\$1.4 billion
	in 1978	\$1.8 billion
	in 1980	\$3.4 billion
	in 1982	?
	in 1984	?
	in 1986	?

WHO PAYS? III. HOW MUCH? 2.

It is shown on the previous page that present realistic estimates of the cost of Marble Hill construction and equipment must be set at \$4,500,000,000. This is a conservative estimate. An article in the Wall Street Journal [01/08/81] "Fate of Nuclear Power in U.S. Could Depend on Troubled Project" reports very similar problems to those that PSI has worked itself into. "In fact," says Patrick O'Donnell, author of the article, "the NRC found so many defects [in welding]--20 in one inspection, 13 in another--that it ordered WPPSS [Washington (State) Public Power Supply System] to stop work for several months on major parts of one plant. The NRC has even raised the possibility of 'suspension, modification or revocation' of the plant's construction license."

Work had begun in the early 1970s on the WPPs first 5 nuclear units estimated then at 4 billion. The price tag is now 17 billion, and still no power has been produced (see p. 31).

What about the cost to the PSI consumer? Marble Hill's \$4.5 billion cost is likely to be amortized (paid off) in 30 years @ 12% per year for financing costs:

This cost is estimated @ \$565 million annually.

PSI's 534,454 customers must therefore each pay an average of:

$\frac{\$565 \text{ million}}{534,454}$ or \$1057 extra per year for 30 years

Last year's total revenue (all receipts from customers) was:

\$628.5 million, which amounts to:

\$1176 per customer.

Therefore, it appears that all PSI rates must be increased by:

$\frac{1057}{1176}$ or 90%, just to pay for Marble Hill, writes

Mr. Hauck.

WHO PAYS? IV. THE SUBSIDIES WE PAY. 1.

When Marble Hill was first announced some five years ago, the cost was listed as \$1.4 billion, equal in magnitude to about 80% of PSI's total investment at the time. Three years ago, this grew to \$1.8 billion, equal in number to about 90% of PSI's bond --and shareholder's money. However, more than a year ago, we said that the proper figure should be at least \$3 billion. The discrepancy prompted us to dig deeper, and on August 7, about a year ago, after analyses of cost figures used by public service commissions in the Northeast and in the deep South, we concluded that \$4.5 billion is a much more realistic cost figure. Thus, Marble Hill alone, if it is ever finished, will triple the investment in the entire PSI system! Less than two months ago, Mr. Barker admitted that Marble Hill might cost \$3.4 billion: more than double the original amount, but still more than 1 billion dollars short of total reasonableness. PSI's money reasons for building a facility, that may never actually be needed, and that could, if ever completed, cost ratepayers more than 50% increases merely to pay the financing costs of Marble Hill may raise speculation.

Following, is the story of Marble Hill's many federal "subsidies" and of the money enticements for PSI executives and other employees to fantasize a need for additional capacity (see, also, pp. 28-30.)

About a year ago, the Ohio River Basin Energy Study (ORBES) spent \$31,000 for a special electric utility study to be done by Cornell University utility economist, Dr. Duane Chapman. The study, just completed, and fiercely resisted by the utilities, is called "Energy Production and Residential Heating: Taxation, Subsidies and Comparative Costs." It includes a year-by-year comparative analysis of the effect of five different federal subsidies on earnings. The prototype plant is situated in Southern Indiana. The study's computer readout says that PSI, if Marble Hill is ever completed, will receive a total of \$1.86 billion as a total of five different subsidies; and this will occur before it can generate a nickel's worth of electricity in just the 5 year period before going on line.

An interesting aside is that the \$1.86 billion is not subtracted from the rate base but is considered "manna" from Washington and treated as retained earnings. (Continued on the following page.)

In the following pages I excerpt from Dr. Chapman's study.

WHO PAYS? V. THE SUBSIDIES WE PAY, 2.

What are these subsidies that we pay either through utility rates or through general Federal or State taxes and that are referred to on the previous page? The answer is found in the "Appendix" to a report of the Ohio River Basin Energy Study (ORBES), "Energy Production and Residential Heating: Taxation, Subsidies, and Comparative Costs," by Duane Chapman, Kathleen Cole, and Michael Slott, Cornell University, March 1980, obtainable from the Office of Research and Development, U. S. Environmental Protection Agency, Washington, D.C. 20460.

This is a complicated matter and for utmost clarity I quote frequently from the "Appendix." AFUDC income is the Allowance for Funds Used During Construction, that is, before any power is produced.

The significance of AFUDC, of course, arises from its inclusion in accumulated rate base which is the basis for future rates. . . .

By way of illustration, For a representative 2.5 billion plant having a 10-year construction period from 1978 to 1987, AFUDC would add [at an 8% rate] \$600 million to the plant rate base and \$40 million to the fuel rate base. None of this is taxed as earned, and is all defined as part of net income.

Interest deductions.

Interest expense payments are generally viewed in the United States as ordinary business expenses and thereby deductible from taxable income. However, the other form of capital contribution--stock and equity--have payments made to them subject to tax liability. Consequently, utilities prefer debt to new stock issues in part because a dollar of new debt reduces overall tax liability while a dollar of new equity does not.

WHO PAYS? VI. THE SUBSIDIES WE PAY, 3.

This is a continuation of the previous page and reports Corporate income tax provisions that affect power generation and encourage building power plants even beyond needed capacity.

Investment tax credit.

The investment tax credit is a direct reduction in tax liability. At the maximum rate, it is equal to $11\frac{1}{2}$ percent of qualified investment. Qualified investment is essentially construction cost excluding land and structures. AFUDC is not included. Qualified investment is thus approximately 95% of construction cost. The maximum effective rate, then, is 10% of actual construction cost. [The $1\frac{1}{2}$ percent of the $11\frac{1}{2}$ percent is taken up next.]

A possibly important incentive to building is provided by the last $1\frac{1}{2}$ % of the investment tax credit.

Put in its simplest terms, this portion of the investment tax credit uses public funds to increase the compensation of utility managers who choose to construct a new plant. This interpretation has not been seen as invalid by Treasury Department personnel with whom I have discussed this problem.

As an illustration with data utilized in this study, the investment tax credit reduces the company's tax liability by a sum of \$275 million. [See previous page also.] Of this amount \$36 million is contributed to the stock ownership plan [$\$2.5 \text{ billion} \times 0.95 \times 0.015 = \36 million]. In addition, the cost of administering the plan is creditable against tax liability.

WHO PAYS? VII. THE SUBSIDIES WE PAY, 4.

I continue to report from Dr. Duane Chapman's ORBES analysis, referred to above.

Accelerated depreciation.

For net income determination as well as rate-making, depreciation expense is defined by the normal straight-line basis. Depreciation expense is simply assumed to be spread equally over each year of the plant's life, and is each year equal to 3-1/3% of original cost.

Accelerated depreciation literally speeds up depreciation for tax purposes. By placing larger deductions in earlier years, it shelters significant income in those years from tax liability. . . .

The normal rate is doubled, from 3.33% to 6.67%. This percent is applied to the undepreciated basis at the beginning of each year, and the result is current depreciation for tax purposes.

(It seems that two sets of books may be kept. One for tax calculation by the accelerated method, and one for the "tax" charged for collection to the rate-payers. I am told that this type of sheltering is legal.)

Tax life.

The arbitrary tax lives assigned to nuclear power equipment provide an additional tax subsidy. The IRS permits depreciation to be based upon a 16-year period rather than the 30-year expected life. Consequently, the double declining balance method [accelerated depreciation, which "is most effective in terms of maximum tax reduction"], applied to a 16-year tax life, gives a 12.5% depreciation expense rate. After eight of the 16 years the utility switches over to normal, straight-line depreciation for the remaining basis. This ensures total depreciation in 16 years.

For a \$2.5 billion plant, Federal depreciation deduction is \$314 million in the first year. Normal depreciation for rate base investment is \$104 million.

WHO PAYS? VIII. THE SUBSIDIES WE PAY, 5.

This completes the analysis of Dr. Duane Chapman for the ORBES study, reported earlier, on taxation and subsidies, as I excerpt it.

Repair allowance.

The IRC repair allowance has been interpreted to allow a company to elect the larger of either actual repair expenses or the IRC percentage allowance as deductible expense. Utilities frequently select the percentage allowance because it exceeds actual expense.

The repair allowance rate for a nuclear power plant is 3%, giving an allowance of \$75 million in 1988 for a hypothetical plant. [See V of this series.]

Non-taxable dividends.

As effective tax management brings the utility into a position with no significant tax liability, the utility may exempt its dividend payments from income tax liability for the recipients of the dividends.

Suppose a company normally has a positive and significant net income and net cash receipts: it is in a position to make dividend payments if it elects to do so. Suppose it has, for tax purposes only, no taxable profits. Then, all its dividends would be tax-exempt for dividend recipients: it is essentially a fictional capital repayment.

Indiana corporate income taxation.

Indiana tax provisions differ [from the Federal] in four ways. First, the rate is 3% rather than 45% on net income. Second, there is also a revenue tax. Third, no investment tax credit is applicable. Finally, the Indiana tax liabilities are deductions from Federal taxable income.

Dr. Chapman [Reference in VIII-2, above] points out:

Tax policy will give the lowest after-tax cost to utilities and their customers if credits, exclusions, and deductions are claimed at the earliest possible dates. As a result, no depreciation deductions will be available in the last years of a plant's life.

Net income and net cash flows follow from the regulatory and tax policies, and are very low or negative in the last year of a plant's life.

The overall result is the creation of a financial incentive for premature construction of new plants and premature retirement of old plants [p. 15].

WHO PAYS? IX. THE WVPA ELECTRIC COOPERATIVE?

During the Nuclear Regulatory Hearing in the matter of PSI's proposed Marble Hill Nuclear Generating Station, Units 1 and 2, at the Madison Jefferson County Public Library, September 28, 1977 Dr. Gustave Linenberger, member of the Atomic Safety and Licensing Board questioned Mr. Hugh A. Barker at some length. He also questioned Mr. Edward P. Martin, General Manager of the Wabash Valley Power Association [WVPA] which had undertaken ownership of 17% of the Marble Hill station. [Transcript pp. 5978, ff. This document is referred to as Tr-NR.]

Dr. Linenberger asked whether the Wabash group would exercise surveillance over, among other aspects, financial reports that PSI publishes [p. 6015]. Witness Martin said "We will monitor the financial development of the project. . . however. . . we don't have . . . an input into the technical decisions for any phase of the plant." [p. 6015]

DR. LINENBERGER: Suppose part way through construction you look at the summary of expenditures to date and the projections of cost, and you say my gosh, this is not turning out the way we expected at all, and I am very unhappy about this, and I am sure all the member utilities will be also; what recourse do you have?

What do you do about it at that point?

WITNESS MARTIN: We pay our part.

DR. LINENBERGER: Do you feel that you have the right to come to Mr. Barker or appropriate individuals in PSI and say, look, we are concerned and we would sure like you guys to exercise a little tighter reins on this project, or do you feel that you are in a position of having to accept whatever they come up with, whatever they experience in the way the program goes?

WITNESS MARTIN: The answer is we must accept what they ultimately come up with and experience. . . .

DR. LINENBERGER: Mr. Barker, do you have any disagreement with or amplifications on anything Mr. Martin said here in terms of anything being not quite as you would have expressed it?

WITNESS BARKER: No, I have no disagreement with anything Mr. Martin said. [Tr-NR, pp. 6016, 6017]

Note: At the time of this hearing PSI claimed that the Station would cost about \$1,400,000,000. See, now, p. 32. The cost is estimated at over \$4 billion.

PADDLEWHEEL PROTESTS, I. THEIR COSTS.

Many costs of a nuclear plant can not readily--or perhaps at all (see pp. 44, 55, 56)--be quantified. This is the case, I think, with the trauma, fear, mental and emotional turmoil, and frustration that leads people to protest the imposition of a nuke upon them.

Paddlewheel Alliance began unofficially in April, 1977, with a Seabrook support walk up the Ohio River to Washington, D. C. Petitions against the Marble Hill nuke were carried, along with a letter stating local citizen's intentions of stopping construction of the Marble Hill Nuke if the officials would not intervene and halt construction. Since that time PWA has coordinated various anti-nuclear actions including a balloon release, legal demonstrations and rallies, a march and symbolic die-in at Madison, Indiana, fundraising concerts and public education projects. . . . Throughout, we have endeavored to function as a non-sexist, non-racist, non-partizan, non-profit, and non-violent direct action organization. [From Marble Hill Occupation Handbook, Paddlewheel Alliance, P. O. Box 194, New Albany, IN 47150, October, 1978, p. 3.]

1978

- 10/06 Affinity groups and marchers totaling some 125 persons assembled near the Marble Hill site.
- 10/07 The 31 occupiers proceeded to PSI property, climbed the fence and "sat on the ground, holding hands and singing, including 'America the Beautiful.' A PSI representative asked the protesters to leave, and when they refused, officers were summoned to remove them." They peacefully boarded a school bus to the Jefferson county jail. They were booked and released on a \$500 bond each. [Madison Courier (MC) 12/28/78]
- 12/28MC Trial began for 29 protesters--two had appeared earlier, and been fined \$49.50 each.
- 12/29MC Paddlewheel was represented by Steve Richardson, Esq., and Dave Colman, Esq., of Bloomington and Paul Watts, Esq. of Spencer. Jury selection was slow.
- Fifty prospective jurors were questioned yesterday. Only 25 persons were present, the other four having agreed to abide by the jury's decision. 46 new prospective jurors called.
- 12/30CJ Six jurors and one alternate were selected yesterday. The demonstrators have been charged with criminal trespassing, a misdemeanor.

PADDLEWHEEL PROTESTS, II

1979

- 01/03 Louisville Courier-Journal [CJ] 01/04/79. Statements began today. Defense claimed that demonstrators did not criminally trespass because they acted "in response to perceived harm and danger."
- 01/05MC Expert testimony about nuclear power was barred, yesterday, as being irrelevant to the charge. The defense argued that under the state's criminal code, the threat of "imminent serious bodily injury" constitutes duress, which is a defense against a trespassing charge.
- 01/06MC The trial ends in a hung jury.
- 01/10MC Jefferson County Prosecutor decides against re-trial. The trial cost about \$4,000.
- 01/11MC The Madison Courier editorializes that laws covering incidents such as the occupation should be strengthened.
- 02/02MC Trespassing-trial juror says she is scared of nuclear power; learned a lot from the Paddlewheelers' testimony.
- 02/17MC Sheriff Armand would prefer no newsmen at Marble Hill demonstrations because of the crowd appeal of the news-media.
- 05/30MC Paddlewheel alliance announces another demonstration at Marble Hill on June 4. More people than before are expected to cross the fence. Participants are expected from Louisville and Lexington, Kentucky, Evansville, Bloomington, Madison, Muncie, Indianapolis, English, Lafayette, Columbus and Zionsville, Indiana.
- 05/31MC PSI says it will prosecute trespassers. Paddlewheel makes further plans for a demonstration followed by rally in Madison.
- 06/04MC Yesterday a group of Paddlewheelers walked from Reed's orchard where they had camped the night to the Marble Hill site. They listened to talks, then, carefully avoiding a wheat-field on the Marble Hill side, crossed the fence. 89 were arrested. They sat in the field planted trees and sang while being processed. Two school buses took them to Jefferson County Jail. Arraigned in Jefferson County Court today the County prosecutor filed charges against only one, Gardner Weber, who allegedly resisted arrest. The prosecutor has one year in which to bring more charges. He was concerned at converting the court into a propaganda forum by the Paddlewheelers. They joined some 300 to 400 in an anti-nuclear rally on the Madison riverfront.
- 06/05MC Madison Courier editorializes on trespassers, commends Sheriff and his officers, speaks well of rally, approves of Prosecutor not filing charges thus saving expense to taxpayers and cutting off desired publicity from demonstrators.

PADDLEWHEEL PROTESTS, III

- 06/05MC One Paddlewheeler sent to jail for criminal contempt of Court.
PSI files 6,000-page safety analysis report and applies for an operating license for the plant. (See p. 47f.)
- 08/02CJ Pre-trial hearing for Gardner Weber cancelled.
- 08/16MC Council for Gardner Weber yesterday lists 100 witnesses that could be called at August 23 trial. List includes Nader, Spock, Hugh Barker (PSI), Jan Strasma (NRC).
- 08/22CJ Court to decide today if nuclear power can be debated in Gardner Weber trial.
- 08/23MC Jefferson County Court Judge denies motion to suppress nuclear issue.
Jefferson County Prosecutor dismisses charge against Gardner Weber, refusing "to put nuclear power on trial."
Paddlewheel Alliance announces public meeting August 26 in Madison, Ind. with notable speakers, and followed by a candlelight procession to the Courthouse, and a period of meditation.
- 08/24CJ Paddlewheel alliance says more demonstrations are planned.
- 08/27MC About 65 people attended Paddlewheel rally in Madison last night. After speeches Paddlewheel members walked to the Courthouse, each holding a candle.
- 11/02MC Paddlewheel Alliance at a press conference announced no endorsement of either candidate for Kentucky State governor.
- 11/09MC Paddlewheel announces a rally in Indianapolis, Sunday, November 11.

1980

- 05/16 Paddlewheel Alliance Newsletter. A few Paddlewheelers picketed PSI offices in New Albany, Madison and Bloomington. The event was well received by the passing public and achieved WLKY-TV coverage.
On May 28, 50 members of the Louisville area safe energy and peace groups as well as interested individuals met in an anti-nuke, anti-Marble Hill strategy session.
On Friday, June 13, it is planned to mail broken concrete to PSI and NRC with the message "NO INDEPENDENT INSPECTION, NO MARBLE HILL, NO FBI REPORT, NO MARBLE HILL."
A rally is planned on the Louisville Belvedere for Saturday, August 2.
- 08/09 In commemoration of the bombing of Hiroshima and Nagasaki, and to protest renewed construction by PSI and in support of Survival Summer, Paddlewheel Alliance plans a rally, with Canvassing, Theater Protest in Madison, Indiana for August 9.

CHANCES AND COST OF ACCIDENTS

Twenty-three years ago (1957) the Atomic Energy Commission tried to guess the dangers present in a nuclear power plant. They concluded that a serious accident could cause 3400 deaths, 43,000 injuries and \$7 billion in property damage. This estimate was not given to the public.

In 1972 a "more comprehensive" study was undertaken, which issued as the "Rasmussen Report." In that report the experts worked with inadequate data and impromptu methods. They calculated that the probability of a serious accident is small. This conclusion has been widely criticized.

A new report has been published by NRC. This one finds serious fault with the Rasmussen Report, and questions the validity of its use in licensing power plants. [Risk Assessment Review Group Report to the U. S. Nuclear Regulatory Commission, H. W. Lewis, Chairman of the Group, September, 1978, NUREG/CR-0400.] "The consequence model used in WASH-1400 [The Rasmussen Report] should be substantially improved, and its sensitivities explored, before it is used in the regulatory process." [p. xi] (It had been treated like holy writ during the safety hearings for Marble Hill.)

The new Risk Assessment Review Group Report, while it has a pat on the back for the Rasmussen effort, finds its results unreliable in important ways:

1. Its "executive summary," which is all most people could read and understand, the Report says, "does not adequately indicate the full extent and the consequences of reactor accidents; and does not sufficiently emphasize the uncertainties involved in the calculation of their probability. It has therefore lent itself to misuse in the discussion of reactor risk." [p. ix]
2. The error bounds of accident probabilities are greatly understated.
3. The Reviewers were unconvinced of the correctness of the Rasmussen conclusion that fires, earthquakes, and human failures [MI!] would contribute negligibly to overall risk.
4. Its statistical analysis "leaves much to be desired" and is poorly presented.
5. The Reviewers say that "There have been instances in which WASH-1400 has been misused as a vehicle to judge the acceptability of reactor risks. In other cases it may have been used prematurely as an estimate of the absolute risk of reactor accidents without full realization of the wide band of uncertainties involved. Such use should be discouraged." [p. x]

COSTS OF REGULATORY HEARINGS, I.

One of the nearly unquantifiable costs of Marble Hill is that of the so-called public hearings: of the frustrating, deceptive and degrading effects of these hearings.

STV was the only public intervenor that survived the Marble Hill hearings in Madison (see pp. 44-46). Some 33 persons were allowed 5 minutes each to make "limited appearance statements" [Tr. p. 785 begins these statements, March 8, 1977]. Twenty-five persons opposed and eight favored the Marble Hill project.

One of the speakers asked "Who is the Nuclear Regulatory Commission regulating? Is there in fact and in current practice an actual separation between regulation and promotion?" [Tr. p. 891] The general feeling was well epitomized by Charles D. Kaplan, Esq., who appeared on behalf of the City of Louisville, Ky. In his opening statement he said:

Somehow, I'm reminded of an anecdote an old history professor of mine at Washington and Lee told regarding the invasion of Ethiopia by the Italian Air Force. And I can very vividly recall the images of the Ethiopian native tribesmen trying to shoot down the Italian Air Force with their spears.

I feel somewhat a kinship today, along with, I'm sure, most of the folks that spoke this morning, with those Ethiopian tribesmen in trying to deal with this maze of federal bureaucracy, with these hearings, and the arsenal that the Public Service Indiana has at their disposal in their attempts to obtain this license. [Tr. p. 920]

NRC Staff held a pre-hearing conference with lawyers for local government bodies, but omitted STV. Thus we had no real knowledge of what was expected of us, while Staff and PSI legal counsel had the great advantage of experience.

We were continually given the impression that what we had to say was irrelevant. This impression arose because the proceedings flowed along like a well-rehearsed ballet between Staff and PSI lawyers, with the Board acting as deus ex machina. Bowing and scraping, and mock contention between them was obvious.

The carefully prepared evidence we gave was ignored, or stonewalled. We said, for example, that all the evidence indicated that there was no need for Marble Hill, that PSI's estimate of growth rate in energy demand of around 7 to 8% was exaggerated, and that even the Staff's mild disagreement in suggesting that 6% was more likely, was wrong. We gave evidence that would lower the forecast close to 4% or less but all the opposition experts dismissed us. We have, however, been proven correct, or even a bit high, by subsequent events. So with some other contentions.

COSTS OF HEARINGS, II

At the time of the Marble Hill hearings Save The Valley people were quite unprepared except for Mrs. Marie Horine, who was the moving force in Save Marble Hill. (This new group was later consolidated with Save The Valley.) She had found the time, somehow, to work her way through the huge PSI environmental statement. She it was who essentially authored all of our "contentions," though her knowledge of nuclear matters was self-taught. Devotion to her family drove her.

In the case of Marble Hill the hearing was a farce, and the construction--the concrete pouring (pages 4-8)--is a tragedy.

Lest our strictures on PSI/NRC seem to a naive reader unduly severe (I feel restrained from making them adequately strict) I turn to a study by Steven L. Del Sesto, Science, Politics, and Controversy: Civilian Nuclear Power in the United States, 1946-1974, 1979, Westview Press, Boulder, Colorado. Del Sesto writes only of the Atomic Energy Commission [AEC] since he cut off his studies (his doctoral dissertation, 1976-78) at 1974. However, the NRC has carried on in this area indistinguishably from the AEC.

In his first chapter Del Sesto remarks of the regulatory process:

The process not only left citizens with bitter experiences, but suggested an inherent weakness in the regulatory process which appeared preoccup. e. with promotional efforts. [p. 4]

Writing of the criticism of the AEC which followed the rapid commercialization of nuclear power and the strain this produced in the regulatory program, together with public concern about safety, Del Sesto remarks:

These concerns were confirmed by citizens and public groups' experiences in the public hearings. It was here that public groups first realized the incredible strength of the nuclear power establishment and their own relative impotence. . . . But more than that, the incredibly ritualistic treatment of public groups via the public hearing seemed to alienate them from both government and big business interests involved with nuclear power development. . . . [p. 110]

Del Sesto [p. 12] quotes John von Neumann, a renowned mathematical physicist. In the 1946 McMahon senate hearing on atomic energy he said "It is only now that science as such and for its own sake has to be regulated, that science has outgrown the age of its independence from society." Technology is not independent. This is why engineers are licensed (or should be).

COST OF HEARINGS, III. THE CRUX OF THE MATTER

There have to be regulations, and there should be public hearings. But the present practice is irrational, illogical, and promotional rather than regulatory. It became apparent during the Marble Hill hearings that the real purpose of that expensive, time-consuming, and humanly debasing and false effort was to provide a legal basis in case of appeal: to show that the law had been complied with..

Yet Save the Valley had to hang in there. If we had withdrawn there would have been no-one to object to high-handed procedures, to try to make NRC toe the legal line, as in the illegal jumping of the gun by PSI in the Marble Hill road construction. (Our counsel Thomas M. Dattilo, Esq., made heroic efforts.) We had to stay in to try to counter the NRC/PSI apparent ballet.

How can the abuses be corrected?

After a utility has spent money on a project (PSI is reputed to have spent about \$1 billion already, and the plant is less than 25% complete). It takes a State Public Service Commission, or other agency an unusual amount of character and guts to say "Halt." But it has been done directly in coal cases, indirectly in nuclear.

Environmental Action Foundation's Richard Morgan, warns us against rate increases, particularly CWIP, a proposal to put costs of construction work in progress into the rate base before--sometimes for years before--the plant produces. He says nuclear projects were cancelled by Consumers, Detroit Edison and Florida Power & Light following unfavorable action on rate increases by the power commissions.

The issue must be joined before money in any significant amount is spent because once it is spent then a certain momentum is on the side of the utility. This could be the beginning of a Lockheed or Chrysler syndrome. The consumer then is forced to pay the bill. (The Iowa Commerce Commission was given full siting and certification, powers to be exercised before the fact, by the Iowa Legislature [ca, 1976]).

When the Marble Hill Hearing was held, PSI had already committed itself to purchases from Westinghouse (see p. 47), had prepared an expensive set of documents and had applied for a license (see p. 47). All this was done behind closed doors, as far as STV was concerned. Then when Staff came to the hearing it was with minds already set. Staff counsel said [Tr., pp. 935-6] ". . . the Staff has not come to the hearing as a neutral party writing on a clean slate. . . ."

Is it any wonder, then, that we found the hearing "degrading from an ethical point of view, and farcical if considered as an opportunity for meaningful public input"? [White Paper IX, 1978]

CHRONOLOGY OF MARBLE HILL CAPER - 1

Note: Dates are important. They help to realize if anyone has been playing changing tunes. Save The Valley has been highly consistent.

The following chronology comes from PSI sources, newspapers, and our own observations. For extended information on certain items see the pages on "Structural Deficiencies," below. The dates given below are mostly taken from newspapers and may be off by a day or so with respect to actual dates of actions described.

1973

- 04/17 Plans for an electrical generation facility in south-eastern Indiana announced.
- 11/13 Announcement of selection of Jefferson County site.
- 11/-- Name "Marble Hill Nuclear Power Station" chosen.

1974

- 08/05 Contract for nuclear part of plant to Westinghouse.

1975

- 07/02 PSI Files with NRC for permission to build.
- 10/08 Notice of hearing published: 40 Federal Register 47219 (1975).

1976

- 01/27 Special pre-hearing conference.
- 03/05 NRC issues draft environmental statement.
- 03/12 Save The Valley states intention to intervene.
- 10/21 Special prehearing conference. STV not informed.
- 11/02 Atomic Safety and Licensing Board admits STV and Save Marble Hill, consolidated as STV, as intervenors.
- 11/22 NRC issues final environmental statement.
- 12/02 Final prehearing conference.

1977

- 02/07 Amended notice of hearing: the co-owners of Marble Hill are de facto co-applicants.
- 03/04 Wabash Valley Power Association (some 23 co-ops) to own 17% of Marble Hill project. NIPSCO to purchase some output.
- 03/08-11; 15-18; 22-25; 04/18-27; 05/2-3. Eventiary hearings in Madison.
- 08/24 NRC grants PSI limited work authorization.
- 08/27-30 Public hearing in Madison on health and safety aspects of Marble Hill [MH].
- 12/13 NRC grants PSI second limited work authorization.

1978

- 04/04 NRC grants full construction permit for MH.

CHRONOLOGY OF MARBLE HILL CAPER - 2

1979

- 04/03 PSI to review MH design in light of TMI accident.
- 04/08 Mr. Charles E. Cutshall gives affidavit to Mr. Robert Gray and Mr. Thomas Dattilo, blowing whistle on shoddy work at MH.
- 04/13 Cutshall quits at MH.
- 04/19 Trimble County, Kentucky, fiscal court adopts unanimous resolution of objection to construction and operation of MH; requests "that same cease and desist."
- 06/12 Cutshall charges made public by STV.
- 06/13 NRC says it knew of some flaws and had ordered PSI to patch them.
- 06/12-14 National Board of Boiler and Pressure Vessel Inspectors representatives inspect MH.
- 06/19 PSI's Barker says construction problems routine, and none poses safety threat.
- 06/21 Government inspection raises questions about methods used to check welds and seams in liner plates designed to contain radioactive materials.
- 06/22 Two federal inspectors begin probe of MH.
- 06/26 James Keppler of NRC Chicago Office arrives to inspect.
- 06/27 PSI announces, at commission's request, halt in pouring.
- 06/28 PSI renews request for full-time federal inspector.
- 06/28 Rep. Deckard says he might request congressional investigation.
- 06/29 A legislative committee of Indiana Senate agrees to study safety at MH.
- Rep. Toby Moffett says subcommittee of the House of Representatives will consider holding hearings on construction problems at MH.
- 07/7-8 Commission allows concrete construction to resume. Dattilo and Gray announce three more affidavits that support Cutshall.
- 07/10 NRC says it will send two inspectors to MH to investigate charges of cover-up. Cutshall identifies more flaws at MH.
- 07/11 PSI's Barker returns to Madison to say that PSI considers the concrete problems serious, but they pose no threat to safety. Will do patching correctly.
- 07/12 Representative Deckard says House subcommittee investigation has begun. Senator Ford threatens Senate hearings.
- 07/12 Francis Durocher, Newberg Construction Co. vice president says Cutshall was planted by STV. STV's reply: "Ridiculous." Durocher says he's going to put ads in the paper to straighten out Newberg's position.
- 07/13 U. S. House subcommittee agrees to investigate construction irregularities at MH.

CHRONOLOGY OF MARBLE HILL CPAER - 3

1979 (continued)

- 07/18 U. S. Senate legislates penalties against failure to comply with safety regulations in construction and maintaining a nuke.
- 07/19 Senate rejects six-month moratorium on issuance of construction permits for new nuclear plants.
- 07/19 U. S. Army Corps of Engineers is asked to analyze strength of concrete.
- 07/20 NRC requests stoppage of concrete work at MH.
- 07/21 Rep. Deckard discusses shoddy work with 35-40 construction workers.
- 07/22 "Marble Hill Damage Wasn't Reported to NRC For 3½ months" Indianapolis Star.
- 07/23 Jan Strasma of NRC credits Cutshali with revealing extent of problems at Marble Hill.
- 07/23 STV places primary blame for safety defects on PSI, secondary on NRC.
- 07/23 Newberg spokesman denies delaying damage report.
- 07/24 Crew from Army Corps of Engineers arrives to review concrete testing results paper work.
- 07/25 Inspectors of National Board of Boiler and Pressure Vessel Inspectors recommend to ASME that PSI lose certificate of authorization unless problems resolved.
- 07/25 Newberg Construction Co. inspectors from 13 to 18.
- 07/26 NRC says it will conduct special inspection of PSI's procedures at MH.
- 07/27 NRC asks Justice Department to investigate charges of cover-up.
- 07/27 Indiana Governor Otis R. Bowen says he continues to support nuclear power, despite problems at MH "because there are no better alternatives."
- 07/31 Before State legislative committee 27 witnesses say MH dangerous to safety and health of area.
- 08/03 U. S. Senate subcommittee asks NRC for documentation relating to criminal allegations at MH.
- 08/07 NRC says PSI must bear much of blame for construction problems at MH.
Construction in safety-related areas halted by order of NRC.
- 08/10 Glenn Rutherford of Louisville Courier-Journal says at a debate in Scottsburg, Jack Simmons, PSI spokesman, alluded to Khrushchev threat of "destruction from within" and said to "take a look within the ranks of nuclear-power opponents to see an ulterior motive."
- 08/15 NRC confirms work stoppage order at MH.
- 08/16 STV asks for a public hearing on MH.
- 08/16 NRC lists 16 problems at MH.
- 08/21 Former MH worker says he was told to alter test results on concrete strength in a structure critical to safety. He refused, but discovered later at least one failure had been changed to meet NRC standards.

CHRONOLOGY OF MARBLE HILL CAPER - 4

1979 (continued)

- 08/22 Laboratory and testing capabilities of U. S. Testing Co. at MH approved "in general" by Corps of Engineers.
- 08/23 NRC defers resuming licensing of new nuclear plants.
- 08/28 Indiana Rep. Michael Kendall asks Governor Otis Bowen to appoint committee to study mismanagement at MH.
- 08/29 U. S. Justice Department orders U. S. attorney and FBI in Indianapolis to investigate construction practices at MH.
- 08/30 U. S. Attorney Virginia McCarty meets with government agents to discuss MH.
- 09/01 NRC says PSI must shoulder blame for construction problems at MH.
- 09/12 Committee of American Society of Mechanical Engineers [ASME] will send inspection team to MH.
- 09/14 Nuclear Certification Committee of ASME has no immediate plans to revoke PSI's certificate to build MH.
- 09/15 Hugh Barker, PSI president, says lack of nuclear power plant experience cause of construction problems at MH.
- 09/20 Hugh Barker defends MH plant at party for Southern Indiana news media personnel in Columbus.
- 10/10 NRC releases five reports harshly criticizing management practices of PSI.
- 10/31 PSI hopes to resume work in January.
- 11/10 A future PSC will decide who pays costs of construction delays at MH.
- 11/23 Kentucky officials must plan to protect citizens from neighbors' nukes.
- 11/27-28 Hearings scheduled by House subcommittee on construction problems at MH.
- 11/27 STV members not allowed to appear at MH hearing.
- 11/28 Charles E. Cutshall at congressional subcommittee hearing says he "opened up a can of worms that turned into rattlesnakes" when he blew whistle on construction problems at MH, but he's not sorry.
- 12/08 Sen. Michael Kendall says "PSI has engaged in a conspiracy to get work done at Marble Hill before they got the work permit."
- 12/12 Indiana's Governor Bowen continues to support MH.
- 12/14 Marble Hill could have difficulty becoming operative due to state or county action via evacuation plan failures.
- 12/24 Wabash Valley Power Association officials have no regret about investment in costly MH.
- 12/29 Indiana officials plan for evacuation drill in Madison area.

1980

- 01/17 PSI expects to resume safety-related work at MH in March.

CHRONOLOGY OF MARBLE HILL CAPER - 5

1980 (continued)

- 01/18 Reps. Toby Moffett and Lee Hamilton request commissioners of NRC to decide when work may resume--not NRC Staff.
- 01/21 PSC plans to offer 500,000 shares of new \$100-par preferred stock to help repay short-term debt and to finance construction.
- 01/22 Trimble County, Kentucky, citizens support fiscal court resolution of last April opposing MH.
- 01/23 Routine inspection last November uncovered 19 alleged violations of federal rules at MH.
- 02/06 In a departure from norm federal NRC Commission will decide MH resumption.
- 02/08 Marble Hill evacuation plan calls for 15-minute warning after accident, 10 mile radius evacuated to 100 miles, special siren in each home in 10 mile radius, with mock evacuation exercise in May or June, says Civil Defense spokesman Geràld Glaze.
- 02/12 State Senate defeats three amendments affecting PSI and MH.
- 02/14 Indiana House bars future nukes unless provisions for disposal of atomic waste made.
- 02/16 Oldham County, Kentucky, backs call for plan to cope with emergency as at MH, but has neither money nor expertise to draw up such plans.
- 02/20 Dean Witter Reynolds, Inc., has downgraded PSI common stock from "buy/hold" to "hold" says it's not as attractive as it has been. Mentions Indiana Public Service Commission's "well-known 'responsiveness' to utilities' needs in rate cases."
- 03/05 PSI submits request to NRC's Stello to be allowed to resume safety-related inspections on materials already received on site.
- 03/11 NRC will hold public meeting in Madison on MH.
- 03/11 NRC meeting date postponed at Mr. Dattilo's request.
- 03/14 EPA rejects Sassafras Audubon and Knob and Valley Audubon request for hearing on MH. Should apply later if they wish, on restart of work.
- 03/25 Meeting in Madison, Indiana on MH nuke.
- 03/26 500 attend NRC meeting on MH.
- 04/02 Southern Indiana Health Systems Agency board urge State and Federal plan for emergencies at MH. Urge monitoring background radiation.
- 04/23 U. S. District Court of Appeals, basing on Supreme Court decision that Kentucky territory extends to low water mark of Ohio River as of 1772, upholds construction permit for Marble Hill.
- 05/02 NRC Staff urge Commission to allow some work to begin at MH. Commission will hire independent engineer to inspect present MH.
- 05/03 Darrell V. Menscer named president of PSI. Hugh A. Barker made chairman of the Board. Menscer "has no experience in construction management."

CHRONOLOGY OF MARBLE HILL CAPER - 6

1980 (continued)

- 05/15 In event of accident all Jefferson County residents within 15 miles of MH could be evacuated within 2 to 2½ hours say officials.
- 06/12 Background radiation tests set at MH.
- 07/10 NRC spokesman says a federal grand jury will probe MH--the first time such a panel has ever investigated construction practices at a nuclear plant.
- 07/17 PSI revises cost estimates from \$1.9 billion to \$3.4 billion. Unit 1 is about 28% complete and unit 2 about 11%. Forecast winter peak load growth trimmed from 6% to 4.4% per year.
- 07/24 NRC demands emergency plans for nukes; "An operating license will not be issued unless a favorable NRC overall finding can be made."
- 08/23 PSI plans rate increase that is not related to construction delays at MH.
- 09/06 PSI vice president Seth W. Shields says 80% of Marble Hill parts now are stored on site. The plant itself is about 16% complete. Unit 1 is about 20% complete and Unit 2 about 9%.
- 09/18 Two contractors at MH, Stewart Mechanical Contractors and LaBarge Products stripped of ASME "N" stamp.
- 11/01 MH plant holds open house for 1,300 visitors.
- 11/08 Federal Grand Jury finishes MH probe without indictments. "PSI would like to say they are totally cleared." STV attorney T. Dattilo said "But they obviously do not understand criminal law." He said grand jury's action does not change validity of some allegations by former workers.
- 11/18 NRC allows Cherne Construction Co. and Commonwealth-Lord Joint Venture to resume receiving and inspecting safety-related materials at MH site.
- 12/03 STV predicts 90% rate hike by PSI due to MH.
- 02/04 Gen. Billie G. Wellman, Adjutant of Kentucky says PSI has a moral obligation to the people of Trimble County, Ky., for their safety and welfare.
- 12/09 PSI asks the Public Service Commission for \$119.6 million rate increase which represents 23% increase in revenue.
- 12/09 PSI says earnings decline from \$3.79 per share common stock for 1979 to \$3.34 for 12 months ending October 31, 1980.
- 12/10 Safety-related work--about half the construction has been halted at MH since August 7, 1979. At instance of STV, NRC hires two independent engineers to study the questionable concrete work.
- 12/27 PSI says no MH costs included in rate hike request.

1981

- 01/22 Indiana Public Service Commission orders Indiana & Michigan Electric Co. to rebate \$9.3 million to customers served 01/01/77 to 09/30/76. Considered a dramatic precedent.

CHRONOLOGY OF MARBLE HILL CAPER - 7

1981 (continued)

- 01/24 Bill filed in Indiana House to prohibit construction of nuke without federally approved waste-dumping plan.
- 01/24 PSI blames rising costs for request to raise rates.
- 01/24 PSI files rate information backing rate request.
Cancels planned units 3 and 4 at MH.

WAR ON PROGRESS?

There appears to be an attempt a-building to convince people that the great things done in this Country in the past (when we had huge spaces, small population) were due to the unregulated state of free enterprise, and that now (when we have huge population, crowded cities) we should "return" to the "old principles" through which progress "was" achieved.

Let me state several principles that seem (to me, at least) reasonable and not overly simplistic in this extraordinarily complex present time.

1. It is not possible to "return." Retrogression is possible, but it would mean deterioration.
2. Healthful growth is necessarily regulated. Unregulated growth is cancerous growth, and usually fatal.
3. The early state of our Country's growth was not unregulated; the regulation was not so much by visible constraint as by respect for religious principles, combined with recognized common law, as well as social pressures.
4. In today's highly secularized world (not necessarily bad) infiltrated by Marxist false doctrine (on the whole bad) and largely culturally illiterate (a tremendous loss of heritage) we may rely on overt restraint and regulation to make crowded existence possible.
5. There is a fundamental law of Nature and of Man which cannot be disobeyed with impunity. It says that growth and maintenance inevitably require effort. This is the way the World is constructed. There is no such thing as permanent status quo. Either there is maintenance which involves healthful change and growth, or there is retrogression and decay. Resting on the oars abandons ore to drift.
6. "The American Dream" is an abstraction from United States of America's reality. This reality is based on principles set forth in our Constitution. If we really believe in these principles, then each of us would have within himself the constraints, the regulation, which would continue the greatness, the power, and the example of principle-in-action, of the best of this Country.

COST - ETHICAL CONSIDERATIONS, I.

Ethics is, in part, the theory of morals. Moral stance may be inferred from actual behavior. It seemed to us, from the behavior of NRC and the utility, that in the Marble Hill hearings many ethical principles were violated.

Extraordinary irony characterized the whole "hearing" process: the Company, with huge financial support paid for by us through rates and taxes was in the largest part supported by the NRC Staff, also paid by us through taxes, to oppose the intervenors (ourselves) who had no financial support except what we could raise.

In addition, the Company and NRC are staffed by people working full time at promoting nuclear energy. The intervenors are mostly people with full-time jobs, working for a living. Their efforts in opposing the Company, and trying to provide for health and good quality of life for themselves and their progeny, must be taken on in addition to their regular jobs.

During the hearings the onward-rolling parade of experts--paid for by the public who are the victims--is impressive. Or, it would be were not many aspects of truth over-ridden in the name of sacrosanct 'generic' often out-of-date rules, or merely omitted never to enter discussion.

The name of the game, it seems, is to win legally and get the plant licensed. Reason and Justice have a tough time in this atmosphere.

One reason that Justice has a hard time is especially apparent in the strenuous attempts made by the lawyers opposing the intervenors to narrow down contentions if possible to such constricted statements that they can be answered in Yes/No terms. In a hearing on environmental questions such narrow contentions are only obtained by distorting the facts. To arrive at truth and justice in an environmental situation requires the evaluation of many impinging variables, each of which intimately affects the others. To rip one or two out and make them narrow enough--as claimed--to be "adjudicable," is usually to destroy the ecologic approach.

If the contentions are narrowed sufficiently then important considerations of justice and ethical behavior are automatically excluded. This is because these considerations--inconvenient for an approach which is designed to win, irrespective--are highly dependent on the context.

When we tried to bring together several related issues that affected each other, for it was impossible to stick to "the truth, the whole truth, and nothing but the truth" and at the same time ignore all except one of the variables under discussion, our testimony was called "messy" [Transcript of the hearings, p. 1759]. Perhaps, it occurred to us, in the oath, "Whole truth," should be omitted.

COST - ETHICAL CONSIDERATIONS (continued), II

If, as was repeatedly said, these were environmental hearings, then one would rationally expect them to be holistic and future-oriented. Neither of these ethical requirements was adequately met. It seems to me that we are back to 1776, when absentee owners tried to control and profit from the people whose quality of life they were injuring.

An important ethical principle is violated when construction of a plant is begun: first because the scales of justice may be tilted by that act toward continuing the construction, and secondly because once action is taken otherwise available options for changing plans may be foreclosed. A comment relative to the first point was made by Justice Douglas in another case:

Plainly these are not findings that the 'safety' standards have been met. They presuppose--contrary to the premises of the Act--that safety findings can be made after construction is finished. But when that point is reached, when millions have been invested, the momentum is on the side of the applicant, not on the side of the public. The momentum is not only generated by the desire to salvage an investment. No agency wants to be the architect of a 'white elephant.' Congress could design an act that would give a completed structure that momentum. But it is clear to me that it did not do so. [Two (2) Treatise on Environmental Law, 1976 Edition, Radiation, Section 6.02, page 6-34.]

The utility had violated regulations by illegally constructing, or having constructed, a portion of the Bower-Marble Hill Road before being given permission. NRC compounded that ethical failure by saying that since the violation had occurred, the matter was moot: "In this case, that whole point is moot because the road has already been built. . . ." [Transcript, p. 951] No wonder that STV's Counsel said that the whole treatment by Staff and Board, including denials of his motions [cf. transcript, p. 949ff] "may encourage the Applicant [PSI] to disobey the law."

NRC further compounded their ethical failure by holding secret meetings with the utility and administering a slap-on-the-wrist fine for the road-construction violation after having explicitly promised [transcript, p. 940] that the matter would be aired and all parties be kept fully informed.

My opinion, after ⁹undergoing this hearing process on the Marble Hill issue, is that it was degrading, from an ethical point of view, and farcical if considered as an opportunity for meaningful public input. The final decision had been made in principle, and not subject to change, even before the "hearings" began.

IN RETROSPECT

Public memory is notoriously short. Over the long period necessary to dig out records, make tests and hear experts, memory of the shocks when we discovered PSI's gross mismanagement and unconcern for public safety (pp. 4-17) tend to fade somewhat.

The shoddy workmanship apparently tolerated by PSI management's inattention to ASME Codes and NRC rules must not be forgotten. The arrogance of PSI's failure to follow prescribed corrective safety measures, as shown when four months after the first ASME visit PSI was found not to have implemented "comprehensive and responsible corrective action" (p. 19, 20) is diagnostic, it seems to me, of the whole operation.

I have recapitulated and interpreted the sorry tale of the costs-monetary, social, mental and emotional and ethical--of this extravagant adventure called "Marble Hill."

The foregoing pages may recall the shock of discovery that the containment building would be porous to radiation. The structure, supposedly built to strict specifications for safety, was allowed to have pieces of wood and other construction debris embedded in walls and joints (p. 18). Concrete was permitted to be poured into forms that contained standing water (p. 18). Pouring was done in the rain (p. 8).

Yet this building was to be the last bastion, in case of serious accident, between deadly radiation and thousands of deaths in a countryside of 100 square miles, rendered uninhabitable (p. 43).

The whole stupid business has us paying exorbitantly for construction of an unneeded plant of the most expensive kind AND paying to make plans to run for our lives from it in case of accident. And accident-prone is, one must believe, what a plant will most likely be when one surveys the history of its shoddy workmanship (pp. 4-8, 18-20) and infers the corporate unconcern for the public which seems to show forth.

Further, evidence continues to accumulate (pp. 21-25) that if the plant were to be built and if it were put into operation, the workers in it and the people at any time downwind of it would inevitably, even discounting the unplanned radiation releases, be at serious hazard of leukemia and other cancers. A bushel of loud words can not hide the certainty of indiscriminate killing.

It would seem to me that PSI would be wise to cut their losses now, before they pour \$4 billion into the project on top of what has been thrown away in the shoddy work. A good case could then be made for management with the guts (and humility as "public servants") to admit a mistake--possibly made at first in all good faith, but check-mated by circumstance. This might prevent corporate financial melt-down.

In any event, the plant could be moth-balled for two or three years in its present state. A final decision would then await more knowledge of real energy needs.