STATE OF MICHIGAN

BEFORE THE MICHIGAN PUBLIC SERVICE COMMISSION

In the matter of the Application of CONSUMERS POWER COMPANY Authority to Issue Securities	))))	Case No. U-6360

BRIEF OF ATTORNEY GENERAL

AND MICHIGAN CITIZENS LOBBY

** Oral Argument Requested **

MICHIGAN CITIZENS LOBBY

Alan J. Barak
Attorney for Michigan
Citizens Lobby
400 S. Washington
Lansing, MI 48933

(517) 372-7111

FRANK J. KELLEY
Attorney General

Hugh B. Anderson
Assistant Attorney General

Roderick S. Coy
Assistant Attorney General

Patrick J. Devlin
Assistant Attorney General
630 Law Building
Lansing, MI 48913
(517) 373-1123

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I. SUMMARY OF THE CASE

This case should be easy to resolve, because the outcome of a workmanlike, well-documented economic analysis shows that CPCO ratepayers stand to gain $707 to $1348 million[1] (the range reflects final Midland cost, load growth, and investment recovery, and length of operation), if the Midland nuclear power plant is cancelled now. But it appears difficult to resolve because company managers have permitted the project to get away from them, sinking $1.3 billion into the project.

The decision in this case is not, however, how to make a bad investment into a good one. The decision is whether to permit the errors of that investment to compound--should the Commission authorize $2 billion to $3 billion more to be spent on Midland. It is a certainty that someone, whom the securities act protects, either securities holders or ratepayers, will suffer the consequences of ill-spent additional monies. The reliable evidence in this case shows that the "package" costs of building and operating Midland are $707,000,000 to $1,358,000,000 ($813 million midpoint) higher than those for a coal plant. The Commission must act on that evidence to protect the securities holder and ratepayers.

Summarizing this case is at the same time easy and difficult. It is easy from the standpoint of a general economic analysis. It becomes somewhat complex as one goes point by point to demonstrate the unfounded economic values inputted by Consumers Power Company which require fair corrections and reverse the outcome of the analysis.

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[1] Discounted to 1980 dollars--actual mixed current dollars would be higher yet.

By way of background, the Midland nuclear plant project was projected in 1967 to have a total completed project cost of $256 million and to be in commercial operation in 1974. The project commenced construcion in 1969. It has skyrocketed in price through at least five forecast revisions, so that in June, 1978 the total project was to cost $1.67 billion, <u>including a contingency for cost overruns</u>.

By way of comparison, construction on the Campbell 3 coal fired plant built by Consumers was started 5 years later than Midland (March, 1974) and was finished in 1980. It is 770 MW, and total project cost is approximately $600 million. Thus, had Midland been coal fired, even starting it five years later (which would increase project cost due to inflation), two coal units the size of Campbell 3 could have been built for not more than $1.2 billion. It would have been an additional 200 plus megawatts (2 x 770 = 1540 MW). Thus, there is a sound argument that when comparing Midland to an alternative, it should be compared to a contemporaneously built coal plant. If this were done, instead of using $2.035 billion in Consumers "breakeven" equation for coal capital cost, a figure of $1.2 billion or less should be used, roughly half the cost. The cost of Midland is at least $2,000 per KW (3.1 billion x 76% electric divided by 1300 MW electric). The cost of Campbell 3 is less than $800 per KW ($600 million divided by 770 MW).

The Bechtel Power Corporation is and has been the architect and engineer (A and E) for the project. A "forecast" is a detailing by Bechtel to Consumers Power Company of the estimated cost for the Bechtel portion of the project. The

Bechtel portion of the project is the lion's share, with the additional items being AFUDC (allowance for Funds Used During Construction, the capitalized interest expense) and Consumers Power Company directs and overheads, and the contract for the Nuclear Steam Supply System (NSSS).

There is no set time period after which a new "forecast" issues by Bechtel. Bechtel advises Consumers fairly frequently of projected or trended cost overruns. On or about January 25, 1980 (I-133, P. 55), Bechtel delivered the latest Forecast to CPCO, being Forecast 6. (I-42) Bechtel's portion rose from 1462 billion in Forecast 5 to $1.784 billion in Forecast 6, a 53% increase. Consumers added AFUDC and the other items listed above, which indicated that the total project price had gone from $1.67 billion to $3.1 billion, a whopping increase of 85%! Forecast 6 was requested by Consumers, as they had been kept informed of the steadily trended cost overruns over Forecast 5. Thus, Forecast 6 did not come as a total surprise to CPCO management. But it apparently did to the Consumers Board of Directors, as they put Midland on the agenda for their March, 1980 meeting to consider whether in light of the staggering increases Midland should be cancelled or converted into an "alternative" coal fired generating unit. Management then gave the marching orders to CPCO employees to develop a new economic analysis of completing Midland or an alternative, and do the complete studies in three weeks!

Management already had done an economic analysis, right before it received Forecast 6. Intervenors were unable to obtain this analysis, as being one "outdated." The hearsay

testimony was that this analysis (based on what it referred to as computer Run A, to designate it as the analysis done immediately before Forecast 6) was even less favorable to coal. However, virtually every input that Intervenors were able to discover with regard to that analysis was more favorable to coal, including the fuel escalation rate, nuclear fuel base price, etc. At any rate, management ordered selective changes to the inputs of that study, nearly all of which were favorable to Midland. For example, operation and maintenance (O&M) cost for the coal alternative units was updated and increased, and the nuclear fuel base price was decreased. This all had the effect of forcing or "jimmying" the equation so that management would get the figures it needed to persuade the Board of Directors. Had the management not done a "quick and dirty" study in three weeks, or had the Board had the benefit of at least some outside study, such as the evidence the Intervenors presented here, even the Board may have made a different decision.

The realities of this situation should not be totally ignored. Once management had persuaded the Board to embark on the Midland plant back in 1967, and sunk costs rose over $1/2 billion, from management's point of view, there was no turning back. Even if the project became uneconomical in light of changed circumstances, they could not voluntarily recommend the halting of the project, and raise the spectre of the Company possibly suffering the loss of this money against a total electric rate base of approximately $3 billion (I-10, P. 3) In fact, this is a dilemma faced by the Board. Even if the

project is no longer economic, are they going to subject their shareholders to the possible loss of $1.5 billion and eliminate any dividends?

Thus, the buck stops here at the Public Service Commission and in the courts of this State to take a long, hard look at the project, and bite the bullet if necessary. The Commission doesn't have to rely on a rushed, back of the envelope calculation that characterize the Company's three week "study." In fact, it has the duty to look farther, in order to protect the stockholders and groups of ratepayers. This Commission can recognize the changed circumstances from where this plant was conceived some 17-18 years before it is planned to operate. Not only is the power from this plant no longer needed for a number of years, because the expansion in the Michigan economy of the 1960's and early 1970's is no longer present, but moreover, the plant that was $256 million has had a 1,100% cost overrun and is no longer the same plant for which initial securities were approved.

The Company's premise in building the plant, which was one current in the 1960's and early 1970's, is that while a nuclear plant of the same electric capacity is much more expensive than building a coal plant, over its lifetime, it will gain back that amount and then some on operating and fuel savings. As the Intervenors case proved, this premise is not valid in 1980, and particularly not for Midland.

In summary, the Company's methodology was to ignore the so-called "sunk" (meaning expended) costs of Midland (except with regard to the contract with Dow regarding the cogenerated steam) which they assessed at $1.3 billion. Thus, they did not compare the price for the two total projects, but rather gave Midland a $1.3 billion head start. Moreover, instead of modelling the joint Consumers and Detroit Edison system for each year with either Midland or the coal alternative in, and then seeing the bottom line for the total difference in capital and operating costs (as the Intervenors did), the following was done. First, Midland capital cost (at $3.1 billion or any other figure) was left out and hand estimated. Second, Midland operating costs were left out and hand estimated. Third, Midland fuel cost was left out, and estimated. Fourth, the coal fuel cost was crudely approximated. This was done by using Run A coal fuel cost outputs in the following manner. Run B selectively changed Run A inputs to 1993. The Company chose only to run outputs for Run B to 1993. They then used Run A outputs for 1994-2020, and applied a "scaling factor" to it. As a result, this Commission cannot look at Exhibit I-79 and determine any information for the years 1994-2020. The scaling factor was crudely developed by picking out four years covered by Run A and Run B, without any showing of statistical significance or correlation, and then extrapolating the four year <u>average</u> ratio for the next 26 years! Incredible! This is significant because the single figure presented by the Company in its so-called "breakeven equation," (being

S-49) which justifies going forward with Midland is the alleged fuel savings of $3.2 billion. Since only 10 years of the 36 years (1984-1994) is based on actual computations, and 26 years is not (1994-2020) over 2/3 of the $3.2 billion alleged savings is subject to serious question.

In fact, the Company based its whole case on the "breakeven" analysis, (Exhibit S-49). We think this Commission will have an impossible task of justifying a decision based on the scribblings of S-49 (See also, I-70, P. 6). Virtually every component of S-49 was arrived at by assumptions without factual basis and by back of the envelope calculations. For example, we challenge anyone to try and understand how the $3.233 billion in operating savings was calculated, based on all of the record, depositions, and extensive discovery in this matter. That single figure encompasses inter alia the following:

(1) That there would be 14 nuclear plants built by CPCO between 1995 and 2014. (I-62) There is no evidence that CPCO could ever finance it, (See S-53), have sites for that many plants, or need them. They would have to begin planning of the first additional nuclear plant next year. This assumption of 14 nuclear plants, however, allowed CPCO to bias its analysis, and reach point No. 2 immediately below.

(2) The coal plants were dispatched at 40% capacity factors, despite historical levels being 75% capacity factor. This is so because the 14 nuclear plants were all dispatched first, artificially lowering the coal capacity factor. Midland was assumed to be 65% capacity factor (61% plus 4% back-up for steam). Since the GWH difference between the 40% and 65% had to be made up in purchases or other operating expense in the coal scenario, it is little wonder CPCO assumed Midland fuel and operating savings.

(3) Nuclear fuel was assumed to increase slightly and coal prices to escalate extensively, so that the differential in costs exploded. There was no competent factual foundation cited outside of the Company which supports this wide differential. In fact, the right hand had not known what the left hand was doing, as no one in the Company coordinated the respective coal and nuclear projections.

To make matters worse, Consumers put on an incompetent and confusing case-in-chief, followed by more of the same on rebuttal. Possibly, they felt that since their securities applications are routinely approved, that they did not need to put on a competent case. Or possibly they felt by putting on a policy witness, that he could not answer some of the questions that would injure their case. At any rate, they put on only one witness, Vice-President Gordon Heins, to testify to the economic analysis, and only one witness, Vice-President Stephen Howell, to testify to how high the total Midland project would go. Mr. Heins repeatedly did not have the qualifications to testify on the respective areas in which he was questioned, nor did he typically know the answers unless fed them by Company personnel. Even then, inconsistencies appeared in his testimony, and he was contradicted by deposition witnesses. If the strategy was designed to shorten the hearing, it worked just the opposite. Because of the laborious process of extracting information from Mr. Heins (he filed only a two page exhibit, (A-47) four pages of testimony, (25 T 2965-68) and no workpapers), the cross of him and Mr. Howell took 33 days, and the record was very confusing. The Attorney General took the position that this

Commission should have the benefit of the full facts and a clear record upon which to make its decision. Accordingly, the Attorney General took the depositions of 22 Bechtel and CPCO employees, covering all phases of the case. (I-109 through I-134) The total time taken was 15 days. Thus, had Consumers presented a colorably competent case, this case could have been completed in 1/2 the time. This is good reason for the Commission to start requiring companies to put on competent witnesses, or face striking of incompetent witness testimony, as a means of expediting these proceedings. Another reason is that hearing officers let hearsay evidence in by Company witnesses, because they expect that someone at the Company would be able to support the value or figure. In this case, it is seen that such testimony as the assumed annual inflation rate could not be competently testified to by anyone at the Company.

The Intervenors Attorney General and Michigan Citizens Lobby instead laid all the facts on the record. They produced three witnesses who were experts in their respective fields. First, Dr. Richard Rosen, a physicist from Boston, Massachusetts, who modeled the joint CPCO-DECO system year by year to 1995 and then to 2020. Next, Dr. William Belmont, an economist from Washington, D.C. who testified to the annual inflation rate and discount rate to be used, and the additional risk premium for additional nuclear generating capacity. Finally, Mr. Jatinder Kumar, an engineer, testified on the overall project cost for Midland (based on historical

project cost and Bechtel's lack of cost control measures on the Midland project) and proper inputs to use on any economic comparison of nuclear fixed and variable expenses compared with coal.

There are striking differences between the Intervenors case and the Company's case. First, the Intervenors' witnesses were well qualified to testify in their respective areas. (See: Rosen, 64 T 6278; Belmont, 69T 6976; Kumar, 73 T 7503) Second, the Intervenor witnesses filed extensive testimony and exhibits which forthrightly described the derivation of their inputs. Moreover, particularly in Mr. Kumar's case, authorities were cited from outside of this case which corroborated his various inputs, such as fuel escalation rate, fixed charge rate, O&M, etc. Thus, his opinion did not stand in a vacumm unsupported by other experts. Rather, his opinion was supported by other disinterested experts.

Dr. Rosen's methodology is fully set out in his testimony in exhibits. Rather than using questionable hand adjustments, scaling factors, and assumed capacity factor for Midland, he ran the computer simulation of the system so that the Commission can see, year by year, the respective costs of the system with Midland on-line or the coal unit on-line. There are no hand adjustments to derive assumed Midland capacity factor and operating costs. Rather monte carlo simulations each year derived it. His modeled system also added capacity as required, rather than arbitrarily adding 14 nuclear plants to drive down

the coal plant in the dispatch order. And coal fuel costs appear expressly, rather than being factored from a four year ratio.

The Company used a 1975 proposed copited structure to assume its rate of return for coal and nuclear to be the same, 11.75. No competent witness in the Company could be found to support it, or the assumed annual inflation rate. Dr. Belmont, on the other hand, did a statistical analysis of coal-fired utility systems compared with those adding nuclear capacity. He determined that there was a risk premium to be added to cost of capital for a utility system adding nuclear capacity. John Andrews, a person with a Masters Degree who had no experience testifying on rate of return or otherwise, and who only had as experience, four years working with CPCO, was supposed to have developed the assumed annual inflation rate. Mr. Andrews had left the Company, and his supervisor, Mr. Parker, testified on deposition. In fact, Mr. Andrews did not develop the assumed annual inflation. Rather, he used projections by un-named persons from a Lexington, Massachusetts firm.

In rebuttal, the Company did not bring in competent witnesses to rebut Intervenors annual inflation rate, the rate of return, or to rebut fuel inputs or O&M inputs. Rather, they offered the testimony of just one witness, just like in the case-in-chief, to try and be a man for all seasons. Dr. William Hieronymous has a degree in economics, and had never

testified in a regulatory proceeding until one month before in California. There, fundamental errors were discovered in his testimony which changed his analysis. Here, he adopted the Intervenor's methodology, but tried to change fuel, coal capital cost, and O&M inputs, which he admitted he had no expertise in. His reason for doing so was that sources in the Company told him to do so--but those sources were never offered and they never stood cross-examination. Mr. Hieronymous candidly did not know the proper level of nuclear fuel cost, or whether perpetual nuclear fuel storage cost was really double counted or not. He also attempted to add a return on the unamortized sunk cost of Midland in a new breakeven analysis, rationalizing that the analysis should be done from sunk costs to society as a whole, rather than CPCO or its ratepayers. Of course, he cited no precedent by this Commission or elsewhere that in a real world a return on an abandoned plant would be permitted as used or useful plant. Lastly, he changed various fixed charge components from both what the Company and the Intervenors had used, to something new and about which he was not even qualified to testify. Mr. Thomas Campbell, the Company's head of its Tax Department was to testify on the Intervenors net of tax treatment of the sunk cost, but his testimony was withdrawn, and the Company withdrew as an issue the ability of the Company to make use of the tax loss write-off.

In conclusion, a contrived phenomena in the construction budgets for nuclear plants is that sunk is always set at a

very high percentage of total cost, so that the plant only has 15-25% "to go" costs. It is just like the proverbial carrot attached to the stick in front of a donkey. The project always just has a little way to go, and it will get to the carrot of completion. It never quite gets there, because the utility controls when a new forecast is released, and it isn't released until the sunk cost is a high enough percentage of it. In this case, CPCO misread the signs, and gambled by releasing a $2.1 billion project cost (now over $3.2 billion) with only $1.3 billion sunk. This "to go" is farther than the sunk amount, and the to go amount will probably increase again. Now is the time for this Commission to seriously look at this project.

In past times, the Commission has had the luxury of leaving building construction to the utility, presumably on the grounds that they knew what they were doing, and secondly, that if it was not needed, was imprudent, was a folly, the Commission could look at it at the time of the issue of rate basing it for the first time, and disallow it. This is the often heard refrain. But that won't work in this case. Here, for the first time, is a <u>multi-billion</u> dollar plant, and it is not just a small speck in rate base, so that disallowing it wouldn't make any difference. Rather, Midland, itself, is larger than the whole CPCO existing net utility plant (and Midland, while it will increase net utility plant--which includes transmission and distribution---by over 100%, will only increase net system generating capability by 19%). As Mr. Hieronymous

ostated, not allowing an amortization of the sunk cost even now would put CPCO in financial distress. Putting blinders on until the project is completed, and denying rate base treatment, would surely force the Company into financial reorganization. So the gamble of the Company and its management is that when rate base time comes the Commission will have no choice but to rate base all or nearly all of it, and that the market will bear rates that will cover the costs.

Accordingly, this Commission cannot just wait to rate base time to put a halt to this uneconomic project. It has to come to grips with it now, or it may have no practical alternative in the future, even if the project goes to $6 billion.

Because of the volume of technical material in the record, this Brief will address itself to some of the more significant issues raised thus far:

II. CAPITAL COSTS: MIDLAND, IF COMPLETED, WILL COST CONSERVATIVELY BETWEEN $3.5 AND $4.5 BILLION.

The Midland plant will carry a $3.5 - $4.5 billion price tag. Intervenors demonstrated the range of costs with two independent analyses. First, ESRG demonstrated that the plant had already greatly exceeded the industry average. Second, Mr. Kumar calculated conservatively that the plant would, if completed, cost $3.5 - $4.5 billion. Meanwhile, Bechtel's Deposition testimony showed that the project cost had already risen to $3.2 billion. CPCO claimed a $3.1 billion ceiling, which it undercut by failing to incorporate hundreds of millions of dollars in decommissioning costs, by arbitrary schedule changes and by its history of cost overruns.

III. THE MIDLAND OFFICIAL COST TREND SHOWS AN 888% COST OVERRUN SINCE THE PROJECT BEGAN - FROM $349 MILLION TO $3.1 BILLION.

In order to determine Midland historical costs' trends, he reviewed the 10 official Company Midland construction estimated, which began with a 1968 projection of $349 million and ended most recently with $3.1 billion in 1979-1980. (73 T 7516; I-148, S-2) Schedule 2 shows the forecast and estimate history, beginning with the 1968 history, running through the first major construction in 1972, (73 T 7516) and ending with the recent official $3.1 billion CPCO projection.

The most recent forecast of $3.1 billion represents an 86% increase over the previous forecast. Id. This forecast will likely be revised from its latest $3.2 billion level (see infra), (73 T 7526; I-148, S-8), which has a 40% probability of cost overruns, id., to a level of $3.5 to $4.5 billion, (73 T 7535).

The forecasts are in two parts. First, Bechtel estimated its contractor/engineer costs, and then the Company adds AFUDC and overheads and its other costs. (73 T 7534) For example, the CPCO "share" of costs on the $3.1 billion estimate equaled 72% of the Bechtel Forecast 6 estimate. (73 T 7533) The forecasts include both scope and schedule components. (E.g. 16 T 1819) The Midland Schedule has continually "slipped" in the forecast, from a 1975 commercial operation date ("COD") to a 1985 COD. (I-148, S-2)

Dr. Rosen independently determined that the Midland trend of forecast overruns is almost without comparison.

Schedule 2

Consumers Power Company

Estimated Construction Costs

of

Midland Nuclear Power Plant

Year	Completion Date	Balance Account 107	Est. Add'l Cost of Project	Est. Total Cost of Project
1968	2/1/75	1,556,544	347,444,000	349,000,5
1969	2/1/75	11,878,048	334,761,952	346,640,0
1970	3/1/77	37,668,052	477,0[illegible]7,000	514,735,0
1972	2/1/80	68,958,479	707,926,521	776,885,0
1974	3/82	205,167,171	751,430,483	[illegible]56,597,6
1975	3/82	273,628,926	1,149,810,921	1,423,439,8
1976	3/82	[illegible]25,535,353	1,244,164,647	1,669,700,0
1977	3/82	655,505,732	1,118,329,000	1,773,834,7
1978	3/82	930,486,205	758,842,579	1,689,328,7
1979	3/85	1,267,936,304	1,836,546,000	3,104,482,3

Annual Reports to the MPSC or FPC

(1) Schedule 435

(2) Schedule 406

IV. DATA FOR THE INDUSTRY SHOWS THAT MIDLAND IS ALREADY PROJECTED TO BE AT LEAST $300 TO $800 MILLION OVER THE AVERAGE PREDICTED COST.

The Midland history of cost overruns is virtually unique. When industry data is examined, Midland, along with the Shoreham Plant on Long Island, proves to be an "outlying point," with costs much beyond the norm. The inference is that the cost overrun problems at Midland are not merely those endemic to the industry, but relate quite specifically to the nature of CPCO's management of the project.

Dr. Rosen ran a generic regression analysis on real nuclear plant construction cost trends prior to TMI. (64 R 6285-90) His analysis with one equation showed that nuclear plant of the size and type of Midland should at most cost $2.82 billion in mixed dollars, exclusive of TMI related costs, (id., 67 T 6685-86) By another, equally statistically valid equation, the Midland cost should be $2.34 billion. Id.

The Company's official $3.1 billion estimate thus presents a plant whose cost will exceed the industry norm by $300 million to $800 million--independent of TMI-related costs.

Dr. Rosen's methodology, data base and conclusion, were unshaken on cross-examination. (65 T 6438-6480; 67 T 6686-88) His methodology involved determining escalation trends without inflation, independent of AFUDC, and then adding back AFUDC to obtain a Midland figure comparable to the Company's estimate, (64T 6288-90; App A). Initially, he used 1980 dollars and

a methodology typical of that which most commissions employ. (65 T 6461) That method differed from the Commission, (65 T 6462) and proved more favorable to the Company, resulting in the high predicted "average" cost of a Midland-type plant of $3.04 billion. (e.g. 67 T 6685-86)

When Dr. Rosen adjusted his equations' output with the MPSC methodology, at the Company's request, his predicted "average" cost Midland-type plant proved to be much lower--at the $2.82 billion level. Then, where he calculated the results from the less favorable-to-the-Company Equation 2, at the Company's insistence, (65 T 6438-40), the results proved lower still for an "average" Midland-type plant at the $2.34 billion level.

ESRG developed its construction cost data base and methodology independently of this case. (64 T 6285; Ex I-96, App. A) The ESRG study incorporated all U.S. commercial light water reactors currently operating, excluding 15 turnkey units and seven demonstration plants - a total of 48 plants. Id. The study examined real construction costs, independent of AFUDC and inflation. Id.

The analysis' two independent regression equations tracked the real cost changes. (64 T 6286-88) The "fit" of equation No. 1, the more generous-to-the-Company equation, proved to be excellent, significantly non-zero at a 99.5% degree of confidence. (64 T 6288) Equation 2 bore a similar confidence level. Id.

Intervenors do not quarrel with the recalculations. Conversely, there was no rebuttal testimony to challenge the bases or the basic methodology of the regression analysis. In his direct testimony, Dr. Rosen highlighted the results of the ESRG data analysis which were most favorable to the Company.

Even at that level--$3.04 billion--Dr. Rosen was able to conclude that the Company had already exceeded the norm. The adjustments on cross-examination simply pointed out that the Company has already greatly exceeded the norm in construction costs.

The question which the regression analysis results pose is "why?" Why is the Midland plant, by the Company's own official estimate, already $300 to $800 million over the norm in the industry?

Mr. Kumar sought to answer the question in his investigation of the project.

V. THE MIDLAND COST OVERRUNS ARE DUE TO COMPANY MISMANAGEMENT AND REGULATORY IMPERATIVES.

Mr. Kumar determined that the principal reasons for the Midland cost overruns are:

(1) Costs and delays associated with government regulations and requirements;

(2) Changes in design independent of government regulations;

(3) The Company and Bechtel tendency to make unreasonably low forecasts;

(4) Cost-plus contracts with the contractors; and

(5) Deficient cost control mechanisms.

(73 T 7517)

The government-related increases have yet to be felt substantially. Earlier in this case Mr. Howell, attributed the cost overruns to "the regulatory process," (16 T 1816) tieing $41.5 million in Forecast 6-based scope changes to regulatory requirements. (18 T 2057-58) But his opinion was unfounded on any company study aimed at determining the definite proportions of regulatory-related cost. (16 T 1827) Most of the increases in Midland cost from Forecast 5 to Forecast 6, a total of $622 million in Bechtel's estimate, were not due to government regulations. (73 T 7518-20) In fact, more than $350 million of Bechtel's increases were attributable to the contractor. (Id; Jones' Deposition, I-133, P. 131, 149, 92-93, 150) The TMI-related costs are yet to be factored in. (73 T 7530)

Another reason for the history of the Midland overruns is that they track the nuclear industry's tendency to make low

cost forecasts for nuclear plants in order to make the proposed plants more attractive. (73 T 7521) The understated costs include decommissioning costs, nuclear insurance costs, replacement power, and waste disposal. (73 T 7521)

Cost-plus contracts also lead to nuclear plant cost overruns. (73 T 7522-23) The Midland construction contract is a cost-plus contract, passing on all wage escalations, certain sub-contract costs, and all Bechtel costs. (I-133, P. 42-46) Bechtel, the contractor, operates on both cost-plus and fixed fee basis. (I-133, P. 42-43)

There should be careful external controls on the cost-plus items, but Bechtel lacks such controls. (73 T 7523) Bechtel never checks its San Francisco national escalation estimates against Midland experience, (I-133, P. 38-39), never compares budgeted and actual allocated item expenses periodically and in writing, (I-133, P. 60, 64), fails to investigate the reasons for overruns, id., and no one at Bechtel has ever estimated the number of subcontracts or their dollar amounts tied to escalation indicies, (I-133, P. 75-76) Further, CPCO through Bechtel, has paid for unsatisfactory work, the emergency safety features actuation system, including studs, and the Zack Construction heating and ventilating work ("HVAC"). (I-134, 121-22, 127-28, 130-31, 148-50, 152-56. See also; I-133, P. 180-81, 184)

CPCO disputes of Bechtel-supervised billings amount to two thousand dollars for license and title fees on a highway

vehicle, (I-134, P. 130-31) and accounting treatment of the Michigan single business tax, (I-133, P. 177-79).

Typical of the CPCO-Bechtel informal cost-control attitude is the CPCO practice of not responding to Bechtel forecasts in writing, (See I-133, P. 145), and the absence of any not-taking by the participants at the important top level CPCO-Bechtel June 25, 1980, meeting where CPCO convinced Bechtel to change its projected fuel load dates to a schedule which seeks to meet the Dow steam contract, (I-133, P. 122-24) Indeed, the June 25 schedule change meeting incorporated no discussion of project cost, (I-133, P. 127), in spite of the additional labor cost involved. (I-134, P. 94-96)

With this background of cost-control, Bechtel now estimates its portion of the project at $1.884 billion, which includes its fee and pass-throughs. (I-134, P. 68, 85; I-133, P. 91) Thus, the prime contractor's numbers are taking the project to a cost level even higher than that officially predicted.

VI. BY BECHTEL AND COMPANY NUMBERS, THE MIDLAND PROJECT WILL INCREASE OVER THE $3.1 BILLION BY $180 TO $260 MILLION.

A. BECHTEL HAS ALREADY ADDED $100 MILLION.

Recent additional Bechtel projected costs already result in firm project costs in excess of $3.2 billion. These costs build on Mr. Howell's numbers. He expressed confidence initially in a $3.1 billion project cost, (20 T 2372) The Company held a major "re-evaluation" of additions and subtractions to schedule and scope during this case, and arrive at $3.1 billion for its firm estimate. (72 T 7532) (Mr. Kumar found this identity of estimates more than mere coincidence; he considered it the product of a totally subjective analysis.) Mr. Howell's confidence in the "new" $3.1 billion figure, that figure is now obsolete.

Subsequent to Forecast 6, Bechtel determined that it's portion of the project costs would increase by $100 million, bringing its share of the project to $1,884 billion. "Rutgers' Deposition, I-134, P. 68, 85-86; Jones' Deposition I-133, P. 91) This increase was based on the schedule in Forecast 6. (I-134, P. 69-70)

But the additional $100 million represents less than a total project cost increase. It is only a Bechtel's portion increase; it does not include AFUDC and other CPCO overheads. (72 T 7533). Therefore, according to Bechtel the project is already firmly estimated at over $3.2 billion.

B. AN ADDITIONAL $72 MILLION FOR CPCO CORRESPONDS TO THE BECHTEL INCREASE.

One can make the approximation for the CPCO costs which will correspond to the $100 million overrun by multiplying the Bechtel number by 72%. This is the Forecast 6 proportion of CPCO to Bechtel costs. (73 T 7534) If it applies to the $100 million increase then Midland is already a $3.27 billion project. Id.

C. CPCO's DIRECTIVE TO ACCELERATE SCHEDULE 8 MONTHS WILL PRODUCE $80 TO $160 MILLION MORE IN COSTS, TO A $3.28 TO $3.43 BILLION PROJECT.

There is a further increase, one worth $80 to $160 million hidden in the accelerated schedule which CPCO managers dictated to Bechtel on June 25, 1980. That schedule change regressed the previous slippage from Bechtel's 4/84 Unit 2 Fuel Load date (A 4/85 COD for Dow Steam) to a 7/83 Unit 2 Fuel Load (a 7/84 COD for Dow Steam).

Additional costs are foreseeable from the acceleration of Bechtel's Unit 2 fuel load date. The new schedule will entail higher labor costs then Forecast 6 predicted, yet there will be no offsetting savings on AFUDC and overheads because the Company will be unable to meet the new schedule.

Bechtel anticipates no substantial cost increases by reason of the acceleration in Schedule. (I-134, P. 70) Bechtel projects deferments in some work until after fuel load, reduction of scope on other items (I-134, P. 87). Bechtel believes the resultant higher labor costs will offset the

savings from the accelerated schedule. (I-134, P. 95; See also I-134, P. 78,83,89-91, 96) Since the AFUDC and overhead cost is approximately $10 million per month, (16 T 1859-60), and the period involved is eight months, the cost of the acceleration will be $80 million. This, however, is a low estimate. According to Mr. Howell, the additional monthly costs go as high as $20 million when purchased power costs are included for the period of a schedule slippage. (16 T 1841; 16 T 1859-60; 18 T 2033)

But, if the new date is not met, and the old date stands, then the amount of this wash--$80 to $160 million--is simply an additional cost over the Forecast 6 estimate. Put differenly, Bechtel's project manager, Mr. Rutgers, (I-134, P.5), failed to state explicitly the costs of the acceleration. But he did state that those costs were equal to the savings for reducing the Forecast 6 schedule slippage. Mr. Howell had already testified that such slippage costs $10 to $20 million monthly--more toward $20 million than $10 million. Therefore, by inference we can tell that the cost that CPCO will put into the acceleration effort is $80 to $160 million.

If the acceleration effort fails, and the Unit 2 fuel load takes place on or after 4/84, the project is still saddled with these extra costs, but without any offsetting savings.

In fact, notwithstanding the extra labor, the old date is likely to stand. Bechtel has only a 20-25% confidence in the 7/83 date. (I-134, P. 84) Indeed, in Forecast 6 Bechtel projected only a 15% confidence level (for a July 83 Unit 2 fuel load.

(73 T 7538; I-134 P. 77, 83; I-42, P. 3). This low level is important because Bechtel has so little faith in any estimate with a confidence level less than 50%, that it routinely re-evaluates such an estimate. (I-133, P. 96-97) Thus, but for CPCO insistence, the 7/83 date would ordinarily be unacceptable. (See infra on the acceleration decision.) By contrast, Bechtel has a 50% confidence level in the 4/84 date. (I-133, P. 213) with no more than a 50% confidence level in an 11/83 Unit 2 fuel load and a 75% confidence level that the fuel load will come after 11/83. (I-134, P. 84-85) Therefore, rather than a wage of $80 - $160 million between higher labor costs and the energy, AFUDC and overheads savings from an accelerated schedule, there is likely to be an additional $80 - $160 million in labor costs on this project, with no schedule change, for a total of more than $3.28-$3.43 billion.

D. UNCOSTED REGULATORY ITEMS WHICH WILL INCREASE THE PROJECT COST TO $3.40 - $3.65 BILLION.

There are regulatory requirements and uncertainties which may add to the cost to complete Midland, because the forecast understates costs. Mr. Kumar estimates their effect to be a $200 - $300 million increase in the project cost. (73 T 7534)

There are methodological reasons to viewing a Forecast 6 based estimate for Midland as an understatement of total project costs. Bechtel acknowledges that it is only an "estimate":

....By definition, a forecast is only an estimate. It is neither a prediction nor a guaranty of future events. The forecast dates and amounts assume a certain set of facts which are, in reality, dynamic and continually in flux. The forecast attempts to estimate the future based on a "window date." It is possible for the forecast to be obsolete on the day it is issued depending on what has happened since the cut-off date.

Response of Bechtel (In Opposition).... to Attorney General's Motion to Compel, September 11, 1980, page 13.

Mr. Kumar showed how the Forecast itself, Exhibit I-42, disclaims the accuracy of its projections:

1. "Civil and structural related quantities do not reflect any increase which may be attributable to the forecast late adjustments (TMI-2 licensing issues, etc). No quantification was available at this time (see Section C-1)." P. B-4.

2. "Pipe and related quantities do not reflect any increase which may be attributable to the forecast late adjustments (TMI-2 licensing issues, etc.). No quantification was possible at this time. See Section C-1." P. B-5.1.

3. "With a few exceptions, the instrumentation quantities are based on an estimate performed in early 1979. Instrumentation-related quantities do not reflect any increase which may attribute to the forecast late adjustments (TMI-2 licensing issues, etc.) and project evolution since early 1979. No quantification was possible at this time, however, a re-estimate and quantity development will be undertaken in the near future." P. B-7.

4. "Analysis of preliminary detailed schedules developed for the licensing issue resolutions being included in the project plan and scope of this forecast indicates a potential for a delay in the draft schedule startup system turnover dates. If no improvement in lead times or establishment of "work-arounds" is achieved, the draft schedule fuel load dates will be delayed.

No assumptions for work-arounds have been used because resolution of each issue is too preliminary in design concept to establish flexibility in the testing program. The following list indicates a preliminary selection of potential schedule delays. Refer to Section C-23 for an additional analysis summary." P. B-12.5.

5. Schedule Exposure

   (a) Incorporation of late scope additions (i.e., licensing) in the manpower level and installation rate plans without extension of completion dates.

   (b) Availability of small pipe support designers to support the design release requirements.

   (c) Space limitations in the power block.

   (d) Contract negotiations for key manual crafts during 1980 and potential for work disruptions. P. B-12.8.

6. To achieve a 50/50% probability of under/overrun a total contingency of $80 million is required, excluding late adjustments.

   This contingency developed is summarized on Pages B-20.2 and 20.3. P. B-20.1.

73 T

Bechtel officials have listed numerous uncertainties or potentialities for additional costly work:

1. Potential delays in the NRC reviews of soils settlement. I-134, P. 110.

2. Physical building space limitations for pipes, conduits, wire cables, pipe hangers, HVAC duct work, etc. I-134, P. 113, 146.

3. The costs of remedying the shoddy HVAC installation. (D T 152-154).

4. The potential for redesign and modifications to some seismic Category I blockwalls and an attendant 0-9 month delay in schedule. I-134, P. 165; I-120, P. 175-176. Bechtel expects the NRC changes. I-132, P. 67-68.

5. The potential for the safety-related design changes for B&W-Bechtel tag cross-referencing on NSSS components and instruments. I-134, P. 166-67.

6. The ability to obtain timely decisions on the implementation, design criteria, design options, and scope for the schedule - critical open licensing items. I-134, P. 168-70.

7. The cost of remedying peeling paint on the concrete (containment) coatings. I-134, P. 172.

8. Possible new NRC earthquake standards for Midland would affect pipe hangers, valves, electrical equipment, pumps, motors, and the nuclear steam supply system. I-117, P. 48.

9. Possible NRC requirements on the transient problem that "once through" steam generators like Midland have experienced. I-132, P. 81, 84.

These cost related items are an addition to Mr. Howell's list of contingencies. (20 T 2373. See Memorandum of Attorney General and MCL in Support of Motion to Dismiss, P. 8-11)

To the extent that the CPCO contingency of $80 million 73 T 7531, covers some of these $200 - $300 million in costs, there will be another $120 - $220 million in costs to the $3.35 billion determined, supra. Therefore, the Midland project's cost is likely to total between $3.40 and $3.65 billion.

E. INDEPENDENT OF THE FORECAST 6 ADDITION, MIDLAND COST TRENDS RESULT IN A TOTAL PROJECT COST OF $3.5 TO $4.5 BILLION

But even the $3.40 - $3.65 billion range is low. Mr. Kumar estimated a $3.5 - $4.5 billion range, independent of schedule slippages past the 4/84 fuel load date, 73 T 7534, 7539. Estimates at the low end of the range vary, depending on the AFUDC rate used--the Company's former 8.5% rate, (73 T 7562) a 9% rate, the Company's 11.75% overall cost of capital, or Dr. Belmont's computed 12.57% overall cost of capital for the to

amounts. (73 T 7534) The resulting costs, respectively, are (a) the Company's $3.1 billion; (b) $3.15 billion, (c) $3.37 billion, and (d) about $3 44 billion. (73 T 7534.)* Adding only the Bechtel $100 million to the last figure results in about a $3.56 billion project cost. 73 T 7534. Adding the $80 million in accelerated schedule labor charges, which Mr. Kumar did not include, would result in a $3.64 billion project.

Mr. Kumar settled on a project cost range of $3.5 billion to $4.5 billion, with the upper bound 41% over the $3.2 billion of already known costs. (73 T 7535). He believed the 41% parameter to be reasonable, and conservative, in light of the historical cost trends. (See id.) By plotting only the Bechtel estimates and adding a CPCO component equal to 72% of Bechtel costs, per the Forecast 6 ratio, he found a total project cost of $4.3 billion. (73 T 7533). This "linear fit" had a correlation coefficient of .94 out of 1.00. Id. If he had used a "best fit" curve, (correlation coefficient .97) the Bechtel portion alone would have trended to $3.3 billion, with a $6 billion project cost. Id. However, he presumed that the trend would moderate as the project came toward completion. (73 T 7533-34). The $3.5 - $4.5 billion range is, therefore, well within a zone of reasonableness.

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* As Dr. Belmont points out, the true costs to the ratepayers of the project are the costs associated with the capital by which the project is constructed, (See 69 T 6990). Therefore, the AFUDC rate, even at 9%, understates the cost which the ratepayers will be required to bear for the plant.

VII. MIDLAND COSTS MAY FURTHER INCREASE DUE TO DOW CANCELLING ITS CONTRACT, SINCE THE COMPANY IS LIKELY TO MISS THE DOW STEAM DATE.

The Midland fuel load dates are significant, not only because of the monthly AFUDC and overhead charges that attend on delay, (e.g. 16 T 1841). They also determine the date the Company will be able to procide steam to Dow. (E.g. I-134, P. 81)

The contracutral date for steam to Dow, 12/31/84, is important because CPCO's failure to meet it permits Dow to cancel the contract for its 300 MW of steam capacity. (16 T 1857) Upon cancellation, Dow would have to pay a cancellation charge based on the to-date allocated steam investment, of approximately $185 million in the spring of 1980, (24 T 2785-87) but this is considerably less than the additional million plus penalty to be paid if it cancelled prior to that date, bsed on the confidential portions of the Dow Contract. Thus, a Dow cancellation would leave CPCO with an additional 300 MW of capacity, worth approximately 24% of the project cost, and which it has not sought to justify as necessary, reasonable, or prudent to serving its other customers.

There is a one year hiatus between the Unit 2 fuel load date and Unit 1's provision of steam to Dow:

Unit 2 Fuel Load	
Unit 1 Fuel Load	5 months after Unit 2
Unit 2 Commercial Operation	7 months after Unit 2
Unit 1 Commercial Operation	7 months after Unit 1

The Forecast 6 dates were:

Unit 2 Fuel Load	4/84
Unit 1 Fuel Load	thus, 9/84
Unit 2 Commercial Operations	thus, 11/84
Unit 1 Commercial Operations	thus, 4/85

(E.g. I-134, P. 71-72)

However, Bechtel had had a 50% confidence level in a Unit 2 fuel load date of 4/84. (I-134, P.), meaning Unit 1 COD and steam to Dow in 4/85. The later accelerated Bechtel projection for 7/83 Unit 2 fuel load was not a strong one; it was at the bottom of a range of acceptability, originally 15% the 20-25% (I-134, P. 77-84). Confidence levels below 50% ordinarily give rise to Bechtel's rejection and re-evaluation. (I-133, P. 96-97) Therefore, the new 7/83 date, with a 20-25% confidence level was entirely unacceptable.

Bechtel maintains a computerized method for projecting schedule. Through a "monte carlo" analysis, it takes projections and confidence levels which engineers for each significant project component make and then run through a computer program which combines them, and which picks the longest construction sequences, calculating percentage composite confidence levels. (I-133, P. 82-83).

Bechtel was aware of the Dow steam contract date of 12/31/84, and of the Company's concern that it meet that date. (I-133, P. 204; I-134, P. 81). Thus, when Bechtel recommended the unacceptable 4/84 Unit 2 fuel load, and its concomitant 4/84 steam-to-Dow date, it was aware of the dates' significance--that these dates meant breaching the Dow contract.

The methodology by which CPCO and Bechtel granted the accelerated Midland schedule is significant for its untrustworthiness. The two firms jointly decided upon an 11/83 "working line" based entirely upon CPCO's "optomism" in obtaining an operating license. (I-134, P. 98-100). Then the firm decided upon, or CPCO dictated

and Bechtel acquiesced in, a new schedule, with a July 31, 1983, Unit 2 fuel load date. (I-34, P. 204) The decision came at a meeting of the two firms on June 25, 1980. (Id., P. 201-204, I-134, P. 79) Attending for CPCO were Mr. Howell, President, Mr. Selby, Project Manager, and James Cook, and Gil Keeley. (I-133, P. 121) Representing Bechtel were Mr. Rutgers, Project Manager, Mr. Prinsch, Howard Wahl, Ken Bailey, and Mr. Jones. (I-133, P. 121).

Previously, in January 1980, CPCO had rejected the Forecast 6 schedule because it meant breach of the Dow contract. (Jones' Deposition I-133, P. 119, I-134, at 81). In a February 4, 1980, meeting the firms had agreed to a November 1983 Unit 2 fuel load. (I-134, at 99).

On June 25, Mr. Rutgers recommended holding the November 1983 Unit 2 fuel load date as a "working line" subject to revision after three to six months experience. (I-134, P. 99) CPCO's Mr. Cook advocated on August 1, 1983, Unit 2 fuel load, with Mr. Selby fixing the date at July 31, 1983. (I-133, P. 203) The participants took no notes of the crucial meeting. (I-133, P. 224) The only written record of the crucial meeting was Mr. Cook's minutes, merely reporting the decision:

Unit 2 Fuel Load	July 31, 1983
Unit 1 Fuel Load	December, 1983
Unit 2 Commercial Operations	December, 1983
Unit 1 Commercial and Steam to Dow	July, 1984

(73 T 7537; See also I-134, P. 71)

Bechtel determined a 20 - 25% confidence level in the new schedule--there was one chance in four that the dates would be achieved or would be earlier. (I-134, P. 85, 203-04)

Mr. Kumar, in reviewing the confidence levels, the Bechtel forecasting methodology, and the history of the previous forecasts, determined that the Unit 2 fuel load would take place no sooner than the original Forecast 6 date of 4/84. (73 T 7538-7539) The conclusion, then, is that the Company, if it were to complete the plant, would be unable to meet the Dow steam date.

VIII THE COMPANY MAKES AN INVALID COST COMPARISON ANALYSIS WHEN IT GIVES EQUAL WEIGHT TO ALLEGED FUTURE SPECULATIVE OPERATING SAVINGS WITH ALREADY EXPENSED CAPITAL AMOUNTS.

Generally stated, it is the Company's position that Midland's capital cost for the total electric position will be $2,537,200,000 (total project of $3.1 billion). The Company's present value (11.75% discount rate) of the two coal units to take the place of Midland is $1,753,050,000. Thus, it is the position of the Company that using their values, that while the capital cost of Midland is 45% higher than a comparable coal plant, that sometime out in the future, beyond 1995, that nuclear operating costs, compared to coal operating costs, will offset this differential in capital cost.

This economic comparison of the Company on its face is unsound for several reasons. First, the capital cost of the Midland nuclear plant (and of the coal alternative) are in current hard dollars. That is to say, there is little argument that the Midland nuclear plant will cost at least $3.1 billion total project. The Intervenors' proofs show that it will exceed this amount. On the other hand, there is no dispute that a differential in operating costs will not amount to the difference in capital costs before 1995. The operating costs beyond 1995, and this differential involving them, are highly speculative. This was admitted by all the experts who testified on the subject. (See, e.g. Parker, I-114A, P. 17; Wilkinson, I-129, P. 47.)

Accordingly, the Company is urging that very speculative future operating expenses may offset concrete present capital expenditures. The Intervenors' case in running out the analysis out to the year 2020 demonstrated that the differential in nuclear operating cost over the full lives of the plants would never offset the differential in capital cost expenditure. Arguendo, even if there was a possibility of full offset, the Company did not dispute that it would occur after 1995. Thus, the Company is urging the reverse of a common saying, namely that "two birds in the bush are worth more than one bird in the hand." The flaw in their economics comparison then, is that they give the same weight to the certainty of the operating expenses 34 years into the future that they give to present and near future capital expenditures. They thus give the same certainty to the occurrence of one dollar today in construction versus one present valued dollar in 2015 related to a differential in operating cost. Since the 2015 operating saving is so speculative and uncertain that it may never occur, it is fundamentally wrong to give it full weight. Either it should not be given any weight, or it should be factored down by a high percentage to reflect the confidence level.

Another reason that using speculative future net operating savings beyond 15 years in the future to justify a decision between generating alternatives, is that it would result in an uneconomic decision for current ratepayers and for those out to at least 1995 (and likely years beyond), and the net savings, if ever, would only be realized by a different

group of future ratepayers, 20, 25, 30, or more years out in the future. Thus, it is uncontradicted that ratepayers through the year 1995 would be far ahead in cost savings if the coal alternatives were built and operated rather than Midland.

By analogy, in rate case concepts, physical plant held for future use held for a period beyond ten years in the future is not permitted in rate base to earn a return. This is so because it is not plant "used and useful" to present ratepayers. If it is held for future ratepayers in the remote future, then it should go into rate base then, so that the ratepayers who get the benefit of it should pay for it. In Midland's case, heavy rate of return and depreciation expenses would be paid by present ratepayers at a total net capital and operating loss compared with the coal plants. And the net total savings, if it ever materialized, would be enjoyed by future ratepayers who did not pay the heavy front loaded expenses of the plant. Obviously, in the later years of the plant, both rate base and depreciation expense for those ratepayers is a bargain; yet they have not borne the expense which allegedly required the choice of Midland to be made. Thus, it is an unfair economic analysis which justifies the decision for current ratepayers to build an uneconomic plant which can only become economic, if at all, to ratepayers more than 15 years into the future.

Lastly, even if one does a 34-year operating life analysis for system fuel and operating cost with Midland in, to be fair in comparison to the system with the coal alternative operative, one should run the coal system an equivalent period. But the Company, in its case-in-chief, ran Midland for 34 years, until 2017 (Unit 2) and 2018 (Unit 1) but only ran the coal alternative until 2020, or only 33 and 32 years for the respective units. The Company charged the coal alternative scenario between 1984-1989 for additional purchase power to make up the difference in GWH generated by Midland. But when Midland retires in 2017 and 2018, respectively, they did not charge the Midland system for additional generating capacity or purchase power for the remaining two years of the coal plants, 2020-2022. Thus, a bias was made for the Midland scenario. Dr. Rosen ran one run to 2020 just to demonstrate that even using the Company's time frame that Midland was still uneconomic. Dr. Hieronymous, on rebuttal, was even less abashed than the Company's case-in-chief, and just stopped the analysis in 2017 so that Midland would not be charged a differential operating cost. He thus introduced an even larger pro-Midland bias, which he cavalierly called "end effects."

IX. THE COMPANY, BY SELECTIVELY UPDATING COAL O&M BUT NOT MIDLAND O&M, INTENTIONALLY UNDERSTATED MIDLAND O&M IN COMPARISON TO THE COAL ALTERNATIVE.

When comparing any two alternatives, intentional error can be committed by either overstating or understating the cost of one of the alternatives. The obvious method of misstating comparable costs is to actually miscalculate one or both of the costs. There is also a much more subtle method available which Consumers Power in fact employed. During a period of rapidly rising costs because of high general inflation rates and specific costs increases, one can bias a study by updating the cost of the less favored alternative while neglecting to update the cost of the favored alternative.

The basing point for both the Applicant's and the Attorney General's O&M expenses are found in Exhibit I-148, Schedules 43 & 44:

Mills/Kwh in 1980 ($)'s

	Coal	Nuclear
Kumar	4.00	4.00
Consumers Power Company	3.71	2.38

The above comparison illustrates that our argument with the Applicant is primarily the unrealistically low nuclear O&M rate. The differential treatment accorded the updating of O&M rates for the two 650 MW coal units vis a vis the Midland units is manifest.

The following basic O&M rates for future units is found in A-160.

Page 5	2.5	mills/kWh	(1980 $)	Prior to 11/1/77
Page 5	2.251	mills/kWh	(1977 $)	11/1/77
Page 14	3.096	mills/kWh	(1980 $)	2/79
Page 7	3.71	mills/kWh	(1980 $)	1/15/79

The 3.096 mills/kWh rate was included in Run A while the 3.71 mills/kWh rate was used for Run B (I-70, P. 90 & I-124, P. 133). The intent of using the highest cost for the coal option is clearly expressed by Mr. Browning in his first memo requesting the update wherein he stated:

> "Also attached is a recent EPRI estimate that reports significantly higher total high sulphur O&M cost of 5.7 mills" (A-160, P. 4)

In sharp contrast to the recurrent updating of coal O&M rates, the Midland O&M rate was not updated. The Midland O&M expenses were developed by Vern Brown during March, 1978. They were based on Palisades 1978 Budgeted O&M expense which in turn was based on 1975 and 1976 data. (I-125, P. 12, 23). Although Mr. Brown was appointed the Midland Plant Controller in August 1979, he was not asked to update his 1978 estimate (I-125, P. 3, 13). The only inquiry was by Mr. Lapinski to a Mr. Lennin regarding more recent information (I-124, P. 135). The importance of scrutinizing Brown's 1981 and 1982 Midland O&M estimates is clear from the following:

A. "Q Mr. Lapinski, did you use one base year 1981 to develop the 1984 projection and one base year 1982 to develop the 1985 projection, as well as all the projections for the years after 1985 out to 2018?

A Yes."

(I-123, P. 96)

B. "Q Do I understand that the information obtained on page 70 was verbatim taken from Mr. Brown or is there anything you did to escalate it or adjust it?

A The information was escalated, and the derivation of that escalation rate is indicated on page 71."

(I-123, P. 95)

C. Midland O&M costs were not put in the computer. They were only in the $840.4 M projection. (I-123, P. 92-95)

D. "Q In Mr. Howell's testimony, and I believe in your testimony, the specter of the NRC requiring additional systems, retrofit systems for various things has been raised. If the NRC does require additional systems to be installed on Midland, does your equation provide for any resultant increased maintenance or additional A&G arising out of that?

A No. The maintenance -- the O&M amounts are assumed in the study. If those are not good projections, then we do not have whatever else is required.

Q To be clear then, if the NRC required additional personnel for monitoring, additional personnel for security, so forth, those would not be reflected in your current O&M rate, is that right?

A If such requirements are not included or anticipated in the O&M projections that were made and used, then there is no provision for them."

(T-4387, 4388)

The need to update the 1978 Midland O&M estimate is evident from the Deposition of Mr. Brown:

A. NO ALLOWANCE FOR INCREASED OR EXTRA-ORDINARY MAINTENANCE.

"Q The years 1980 to 1992 depicted on page 5, then, assume no increased or extra-ordinary maintenance, is that correct?

A That is correct."

(I-125, P. 23)

B. JOINT EXPENSE UNDERESTIMATED.

"Q On page 1 of Deposition Exhibit 42, there's an entry 'Joint Plant.' How was that developed?

A That's a joint expense. That's the supervision and engineering cost incurred by the engineers and the plant supervisors at the location; and on page 3, Exhibit 42, we use the figure of $2,118,000, which at that time we had an estimate of the number of supervisors and engineers that were going to be required to operate the plant, which, in my own mind, right now, is way too small, because we are -- with the result of TMI, we need more qualified engineers on site to handle our problems." (emphasis added)

(I-125, P. 43,44)

C. INCREASED COMPLEXITY - NEW NRC REGULATIONS - TMI.

"Q Mr. Brown, besides Midland having a larger megawattage capacity than Palisades, isn't it a much more sophisticated, complex plant than Palisades?

A Midland was -- is more complex. How much more complex, I do not know.
....These figures reflect no consideration for TMI costs.

Q The additional systems that appear on Midland that do not appear on Palisades that have been ordered in the intervening years by the NRC through various orders and then subsequent to TMI through various orders, don't those additional systems require additional operating and maintenance expense?

A They would.

Q But you, at Mr. Cherba's direction, just merely multiplied Palisades by 1.5 to reflect just a larger plant but not a more complex plant?

A TMI had not happened when we developed the figures.

Q But other NRC systems had been ordered added since Palisades was built and went on operation, were there not?

A I am not aware of the additions."

(I-125, P. 29,30)

D. ASSUMED INFLATION TOO LOW.

"Q The escalation from 1980 to 1982 depicted on page 2 of Deposition Exhibit 42 was done at 5.4 percent. Would you agree that that's a realistic figure for inflation that you would use today?

A No, it is not.

Q And it is substantially understated, is it not?

A Yes, it is.

Q But this is the basis from which you escalated your 1982 costs?

A Back in '78, this was a reasonable figure to use."

E. NO ALLOWANCE FOR INCREASED SECURITY.

"Q Is the physical situs of Palisades and Midland the same, that is, their proximity to population?

A No.

Q Is the security required at Midland the same as that required at Palisades?

A Midland has a bigger plant site to guard than Palisades does. You have got a pond up there that covers quite a few acres, you have got a fence around the pond, around the area there, so there really is no comparison.

Q I take it you developed no separate security cost studies for Midland. It's just part of your 1.5 times Palisades O&M. Is that correct?

A That's true.
I do have some Palisades cost figures.

Q What figure do you have for Palisades for security cost?

A Palisades -- this is the actual cost charged to security - in 1977 was three million -- or $332,000

Q Would you repeat that?

A $332,000.

Q For what year?

A 1977.
1978, $635,000; 1979, $824,000; 1980, January through June, actual, $510,000.
Our 1981 budget has $1,115,000.

Q Just scanning those figures, they seem to be going up higher than the rate of inflation. Is there a reason for that?

A Have you been through the securities over at Palisades lately?

Q No, I haven't.

A You can't go to the bathroom unless you are escorted.
No, we have been forced to hire a lot more people. There's more surveillance going on. A visitor that goes to Palisades or Big Rock has to be escorted from the plant -- or from the gate into the plant by a guard or an employee, if you can get an employee to come out to get you. So there's more dollars being devoted to security.

Q Again, this reflection of the increased security at Palisades does not appear in your Palisades base that was used here for this 1978 study, does it?

A Right, that's true."

(I-125, P. 47-48)

The Midland O&M expenses contain serious errors in addition to being badly outdated and understated. The 1981 and 1982 costs developed by Mr. Brown are the basis for Midland for the entire period 1984-2018; they were used without scrutiny; they were not adjusted other than adding A & G and being escalated (Exh I-123, pp 95, 96, 97; Exh I-124, pp 136,137).

F. Included Only Ten Months of Expense

1. 1981 Base. The 1981 O&M expense included only 10 months of expense (Exh I-125, p 25).

2. 1982 Base. The second unit included only 10 months of expense (Exh I-125, pp 26, 42).

3. 1983 Base. Both units included for a full year, but 1983 not used to project Midland O&M (Exh I-125, pp 26, 43; Exh I-123, p 96).

"Q Your calculation for 1982 shown on page 3 only includes 10 months of one of the units, does it not?

"A '82?

"Q Yes.

"A Yes. It is 10/12ths.

"Q But you escalated and used the 1982 as the basis for the future years, and by doing so, you are only reflecting 10/12ths of that one unit, are you not?

"A No. If you will look at 1983 on page 3 of Exhibit 42, you will see that 1983 figures for operating expenses of 12,142,000 appears on the

year '83 on page 4 of Exhibit 42; and 14,668,000, which is the maintenance expense, appears on the 1983 line for maintenance on page 4 of Exhibit 42.

"Q This page 1 of Deposition Exhibit 42 depicts 1982 Midland. Would it be proper to escalate that page for 1983 and beyond just using the escalation factor?

"A No. You would have to use the figures that appeared on page 4 of Exhibit AG-42, and using the proper escalation factor." (Brown, Exh I-125, pp 42,43; emphasis added).

and

"Q I take it you did not check to see if the base year that was furnished to you represented a full 12 months of O&M?

"A I don't recollect checking for this set of calculations back in January. I may have checked when the rate case information was being developed a couple of years ago.

"Q Well, at least you operated then on the premise that the base figures did represent a full 12 months of O&M; is that right?

"A Yes, that's the way the number was applied." (Lapinski, Exh I-124, pp 138, 139).

G. No Allowance for Low Level Wastes

"Q Did you do any analysis for cost of low-level fuel waste at Midland?

"A No, I have not.

"Q I have indicated in my notes from someone that you were the one who did that.

"MRS. MILLS: What we said was that if it was included it would have been included within O&M.

"MR. DEVLIN: What would have been included?

"MRS. MILLS: High-level nuclear fuel -- not wates. Gene Van Hoof straightened me out on that.

"Spent high-level radioactive nuclear fuel is contained within the -- the costs of that were contained within your fuel costs, and if there were any costs associated with low-level spent nuclear fuel, if considered at all, they would have been considered within O&M.

"And Mr. Brown said that it is not considered within O&M.

"Q (By Mr. Devlin, continuing) Do I understand, then, that low-level spent waste has not been provided for anywhere, then, in the Midland analysis?

"A It's not in the O&M figures that I am aware of." (Exh I-125, p 7, 8).

H. Excluded Allowance for Incremental Midland O&M Increases

Mr. Brown included an allowance for increased activity levels, as well as escalation increases in his 1978 projections:

"Q What was the escalation rate used?

"A If you will note, all data is in 1979 dollars.

"It was felt that, knowing how the work load was increasing at nuclear plants, approximately every three years our work load would increase approximately 5 percent. And you can determine that -- for example, the 1986 is approximately, under 'Direct Operating Expense,' approximately 5 percent higher than 1985. 1983 is approximately 5 percent over 1982. So we have reflected an increase in work load in about every three years except for Joint Expense.

"Q What present-worthing factor was used to maintain the dollars in 1979 dollars?

"A We used no present-worth factor.

"These are the years' dollars that we expect the dollars to incur, and then we - anybody that wanted to use them could use any escalation rates they wanted to, to get their proper year's dollars." (Exh I-125, p 20).

Mr. Lapinski excluded these 5% incremental increases by merely escalating the 1982 based number for 1985 through 2018. (Exh I-124, pp 137, 138).

A recalculation of Exhibit I-70 is attached that illustrates that the $50.44 $\overline{M}$ 1982 O&M base was adjusted only by escalating at 8.3% and 7.6% annually (Attachment A, p 3). In fact, ignoring Mr. Brown's allowance for increasing nuclear work loads, Consumers escalated coal O&M rates faster than nuclear (T 4337).

I. Improper Allocation of Midland O&M Expense to Electric

The Midland O&M expense is understated for the years 1985 through 2018 in that Consumers assumed that the 1982 base amount fully included the O&M costs assignable to the steam portion of the plant. Thus only 76%, 78% and 72.05% of the O&M expense was allocated to electric.

"Q Are you aware that the 1978 data that was furnished to you which projected a 1982 O&M base cost was cost information on the -- based on the megawatt electric only without any add-on for steam?

"A I do not know that.

"Q I take it from the calculations that appear on I-70, page 70, that at least you assumed the figures furnished to you included steam and in that center column you subtracted out steam O&M; did you not?

"A Yes, that's the intent of the center column.

"Q So if you were furnished figures that were for electric only and you subtracted out steam, then you would have understated O&M expenses; would you not?

"A Yes, if in fact the O&M figures upon which these are based represent only electric-related O&M; that is, they already include a factor equivalent to the center column of this page 70, then they would be understated by the indicated factors." (Exh I-124, p 142).

The development of the 1982 Midland O&M base is found in the deposition of Vern Brown:

"Q And then didn't you say earlier you multiplied that times 1.5?

"A Midland is 1.5 times Palisades, but -- O.K. At that time we had one unit --

"Q (Interposing) Oh, I understand. All right.

"Then let's go to 1982. You take the -- for 1982 you take the Palisades operation and maintenance expenses from page 5 of Deposition Exhibit 42, you add $1 million to each category, and then, on the right-hand side of that, what is the 1/2 of 8428 refer to?

"A That's the half - (the one-half of 8428 of one-half of Palisades -- '79 dollars, plus the evaporator building.

"In other words, Palisades is one unit. Midland is basically 1.5 times -- there's -- yes, 1.5 times the size of Palisades. So -- and if I take Palisades times 1.5, or in this same year one-half the Palisades figure plus 10/12ths of the 4214, which gives me here again the second unit coming on.

"Q I see. We have again a partial year.

"A Partial year.

"Q All right. Then if we go to 1983, we can see more clearly where there's a full year of both units on operation.

"A It's clean, right.

"Q You then take from page 5 the Palisades O&M expenses, multiply them by 1.5, and then add $1 million?

"A Right.

"Q Who determined that Midland O&M should be multiplied by 1.5?

"A If I recall right, it was the Assistant Manager of Nuclear Production.

"Q Who is he?

"A His name was -- at that time was Bob Cherba.

"Q Is it your understanding that you multiply Palisades O&M by 1.5 to arrive at Midland O&M because the Midland megawattage is 1.5 times Palisades megawattage?

"A Approximately. Yes, approximately 1.5 times.

"Q Is that your understanding is his basis for using a 1.5 factor?

"A That's my understanding."

and

"Q (By Mr. Devlin, continuing) Mr. Brown, can you show me in your study anywhere where you included O&M expenses for the steam portion of the plant?

"A The only building actually built that is identified for steam is the evaporator building.

"Q Isn't a portion of the nuclear steam supply system devoted to steam for Dow?

"A Yes, it is.

"Q Show me where you included that portion of the NSSS devoted to Dow in your study.

"A My request was to develop total O&M expenses applicable to the Midland nuclear plant. The allocation to electric and steam was going to be done by somebody else more qualified than I was.

"Q But you only used the electric megawatt to develop the total, not the net rating of the plant.

"A We were requested to develop a ballpark figure, which we developed, and it was determined that we would use 1.5 times Palisades, and Palisades has no cost involved in supplying steam to another customer." (Exh I-125, pp 41, 42).

The inadequacy of Consumers' Midland O&M is demonstrated by taking the Palisades' 1979 budgeted O&M, factoring it up for the increased Midland electric megawattage, escalating to 1985 using Consumers Power's assumed inflation rates, adding 39% for A&G, and making no other adjustments.

		(000)
Palisades Budget 1979 (1)	$	17,600
x Allowance for Additional Size (net ratings) (2)	x	(516+799)/740
	$	31,276
Escalate to 1979 (1.054) (3)		117.09%
	$	36,621
Escalate to 1985 (1.083) (4) (3)		127.02%
	$	46,516
Add: A&G at 39% (4)		18,141
G.O. Joint Expense		Ø
Payroll Tax		Ø
Evaporator Bldg.		Ø
Allowance for Extraordinary Maintenance		Ø
Increased Work Loads		Ø
Increased Complexity		Ø
NRC Regulations		Ø
TMI		Ø
1985 Midland Electric O&M	$	65,657
CPCO's 1985 Midland Electric O&M (5)	$	52,700

(1) Exh I-125, p 18
(2) Midland 1985 MW 516 & 799, Exh I-70, pp 43, 45
Midland 1982 - .966 - Dow 1500 LP
Net MW 522 & 806
Gross MW 569 & 852, Exh I-70, p 78
Palisades 1979 - CPCO Annual Report to MPSC, Net Capacity, p 432, A-5, line 8
(3) Exh I-125, p 42.
(4) Exh I-123, p 96.
(5) Exh I-70, p 70.

Including no allowance for Midland's increased complexity, new NRC regulations, TMI, security, or even including General Office Joint Expenses and the Payroll Taxes found on Exh I-70, p 74, Consumers' 1985 Midland O&M falls $12M short of the projection. The above projection was based on a 1979 budget available to Mr. Brown during March, 1978, hence there are at least five years of escalation at 5.4% included in the above projection, and it still is 23% greater than Consumers' amount. Nor is the base amount abnormal. The O&M budgets for Palisades were $16,090,000 and $16,700,000 for 1978 and 1979, respectively, while 1979 actual O&M expense was $24,446,000 (Exh I-125, p 18).

CONSUMERS POWER COMPANY
Recapitulation of Exhibit I-70, page 70
Midland O&M

	Base	Escalation	Escalated Base	Percent Electric	O&M ($ x 10^6)
1984	28.61	(1.083)[3]	36.342	100.00%	36.3
1985	50.44	(1.083)[4]	69.389	76.01	52.7
1986	50.44	(1.083)[5]	75.148	76.01	57.1
1987	50.44	(1.083)[6]	81.385	76.01	61.9
1988	50.44 x (1.083)[6] x	(1.076)[2]	87.570	76.01	66.6
1989	50.44 x (1.083)[6] x	(1.076)[2]	94.226	76.01	71.6
1990	50.44 x (1.083)[6] x	(1.076)[3]	101.387	76.01	77.1
1991	50.44 x (1.083)[6] x	(1.076)[4]	109.092	77.67	84.7
1992	50.44 x (1.083)[6] x	(1.076)[5]	117,383	77.67	91.2
1993	50.44 x (1.083)[6] x	(1.076)[6]	126.304	77.67	98.1
1994	50.44 x (1.083)[6] x	(1.076)[7]	135.903	77.67	105.6
1995	50.44 x (1.083)[6] x	(1.076)[8]	146.232	77.67	113.6
1996	50.44 x (1.083)[6] x	(1.076)[9]	157.346	72.05	113.4
1997	50.44 x (1.083)[6] x	(1.076)[10]	169.304	72.05	122.0
1998					
1999					
2000	50.44 x (1.083)[6] x	(1.076)[13]	210.913	72.05	152.0
2001					
2002					
2003	50.44 x (1.083)[6] x	(1.076)[16]	262.765	72.05	189.3
2004					
2005					
2006	50.44 x (1.083)[6] x	(1.076)[19]	327.344	72.05	235.9
2007					
2008					
2009	50.44 x (1.083)[6] x	(1.076)[22]	407.794	72.05	293.8
2010					
2011					
2012	50.44 x (1.083)[6] x	(1.076)[25]	508.017	72.05	366.0
2013					
2014					
2015	50.44 x (1.083)[6] x	(1.076)[28]	632.870	72.05	456.0
2016					
2017					
2018	50.44 x (1/2) x (1.083)[6] x	(1.076)[31]	394.204	72.05	284.0

X. THE COMPANY WITHOUT ANY SUPPORT FROM RECOGNIZED EXPERTS, ASSUMED UNREALISTICALLY LOW NUCLEAR FUEL DISPOSAL COSTS AND THUS AN UNSUPPORTED LOW TOTAL NUCLEAR FUEL BASE COST.

The only competent, corroborated testimony on the record as to the proper amount for nuclear waste disposal cost is that by Mr. Kumar; by purposely understating it, the Company has understated nuclear fuel base cost.

The Intervenors used the base price of processed nuclear fuel without disposal costs used by the Company in their "Run A", before they made selective adjustments after Forecast 6 was delivered to them. (Exhibit I-70, pp. 34, 36) To this Mr. Kumar added 1.78 mills/Kwh disposal costs. He testified on cross-examination that the resulting overall base cost of nuclear fuel was reasonable, and that the I-70, pp. 34, 36 number was unreasonably low if it were considered to have included disposal costs. Mr. Kumar's testimony was unrebutted. Nothing in I-70 disclosed that it was to have included disposal cost. After Forecast 6 came out, the Company then made selective changes of the inputs to force the breakeven equation to come out satisfactorily to them. One change was lowering the nuclear fuel base cost (See I-59). In part, this was also accomplished by including as a component of the base cost, the spent fuel disposal cost which was omitted from I-70.

The only rebuttal witness offered by the Company, Mr. Hieronymous, alleged that Mr. Kumar had twice counted the waste disposal cost. But his testimony was rendered worthless when he admitted that there wasn't a disposal cost stated in I-70. Moreover, he had no knowledge as to what proper nuclear base fuel expense should be, was unqualified to give an opinion,

and only deducted the waste disposal cost because someone at the Company told him to do so.

Even looking at the I-59 disposal charge by itself the Company has understated it. First, the Company used an old 1978 figure of $175 KG, which it escalated at 6%, (I-126, P. 49-50) Mr. Kumar did extensive research on waste disposal cost, and concluded that the amount used by the FERC Staff in a contested case of $269.82/KGHM was reasonable and appropriate. (Kumar, p. 56) In fact, current estimates by reliable experts average up to $500 KGHM. (82 T 8556, 8557) Thus, Mr. Kumar was using a conservative cost. The Company's figure is unsupported by any other authorities, and is so low that it deserves no credence. It is yet another example of "low-balling" nuclear operating cost to "force" the breakeven equation.

XI. THE COMPANY, WITHOUT ANY CORROBORATION BY OUTSIDE EXPERTS OR LITERATURE OVERSTATED THE COAL ESCALATION RATE, AND UNDERSTATED THE NUCLEAR ESCALATION RATE.

Here again, the Company used high rates for coal and much lower rates for nuclear (even negative) so as to derive a large nuclear fuel savings. The Company's estimates were not the result of any rigorous study and were based in part on inadmissible evidence; in fact, they cannot cite any other authorities which support them. The Intervenors did extensive research on the proper escalation rates to use, which are supported by authorities.

A. COAL ESCALATION RATE

Gordon Heins, the only Company witness presented on coal cost escalation, knew nothing about how the coal escalation was assumed. The Attorney General took the Deposition of Robert P. Wilkinson and offered the Deposition into evidence as an adverse witness in the Intervenors case-in-chief. (Exhibit I-129)

Mr. Wilkinson has a Bachelors of Business Administration Degree. He is director of coal supply for the Company. He assumed a 4% per year escalation rate for coal, for 1981-1988. The 4% is added to the annual general inflation rate. From 1989 onward he assumed a 2% real escalation. The assumption was based on a review of data in 1977. He reviewed seven or eight contracts from 1960 to 1977 that Consumers had with coal suppliers. Those contracts showed a 6% escalation beyond the inflation rate. He then subjectively decided that he would use 4% over inflation until 1988, and 2% after that. (I-129, P. 89-90)

He admitted that there were a number of factors present in the 1970's that would not be repeated, and so he arbitrarily used the 4% and 2% rates. When using the Company's unsupported, incompetent, hearsay inflation rates, the total annual increase for coal is: 1981, 12.2%; 1982-1986, 11.2%; 1987-1988, 10.5%; and 1989-2020, 8.5%. Compare this to their assumption for nuclear fuel increases: 1980, -6.3%; 1981, -6.2%; 1982-1984, -5.2%; 1985-1986, 2.80%; 1987-1990, 3.5%; 1991-2020, .5%. It is thus obvious how the Company "jimmied" up the nuclear fuel savings. In 1981, for example, there is over a 18% differential in escalation between coal and nuclear assumed by the Company! The lowest differential is 8%. According to Gordon Heins, one input that was selectively changed after Forecast 6 came out was to raise the coal escalation rate. The reason is obvious. Both Mr. Heins and Mr. Wilkinson testified that, despite their projections, they did not know of anyone who projected coal to escalate faster than nuclear fuel. (I-129, P. 101)

At pages 73 T 7546-7552, Mr. Kumar describes his analysis of the factors that will affect the escalation rate of coal. Mr. Kumar is an engineer, having received a Bachelors Degree from the Indian School of Mines, and a post-graduate degree from the French Petroleum Institute, and is a member of the American Institute of Mining, Metallurgical and Petroleum Engineers. First he notes the huge reserves of coal, citing to "Coal - Bridge to the Future" which Mr. Wilkinson believed was authoritative. At I-149, Schedule 26, Kumar shows that supply of coal has exceeded demand, and in

Schedule 25 shows that future supply in the United States, by region, will greatly increase. Secondly, historical escalation rates for coal was 2% between 1960-1970; % between 1950-1970; and 4% in the early 1970's, slowing in the last four years. Thirdly, mining productivity is projected to increase by the Federal Energy Administration. Fourth, the Annual Report to Congress projects an annual average increase of 2.5% to 1985, 1.54% to 1990, and .29% from 1990-1995. The Electric Power Research Institute projects escalation at 1% to 1990, and lower thereafter. Based on all of the above, Mr. Kumar concluded that escalation of coal at 1% over inflation was a very reasonable projection and adopted it.

B. NUCLEAR FUEL ESCALATION RATE

Gordon Heins also could not explain the basis of the assumed escalation for nuclear fuel. The Attorney General took the Deposition of Eugene R. Van Hoof, and put it into evidence in the Intervenors case-in-chief as that of an adverse witness. (Exhibit I-126) Mr. Van Hoof, the Company Director of Nuclear Fuel Supply for 2 1/2 years, has had no experience in the procurement of nuclear fuel. (I-129, P. 7) Mr. Van Hoof assumed real (inflation included) escalation rates of -6.3% for 1980; -6.2% for 1981; -5.2% for 1982-1984; 2.80% for 1985-1986; 3.5% for 1987-1990; and .5% for 1991-2020. These escalations were arrived at subjectively. (I-129, P. 23,40) Though, for example, the fabrication component escalated 18% in 1979, Mr. Van Hoof used 8% for his projection. (I-126, P. 46) In fact, Mr. Van Hoof had little economics training, and never bothered to look at the actual historical escalation rate of nuclear fuel to CPCO. (I-126, P. 68-69)

At pages 37-44, Mr. Kumar traces the factors that will affect the escalation rate of nuclear fuel. First, uranium reserves are limited to a very few countries (4 compose 80.3% of WOCA). In 1990, eight countries will account for 95% of WOCA production, with one of them, Australia, accounting for 93% of the potential increase between 1985 and 1990. Moreover, within the United States, now only a handful of companies account for high grade uranium production. During the earlier years of the uranium mining industry, there were many small to moderate size producers. In 1977, four companies accounted for 50% of productivity, 7 companies for 75% of production.

The small number of producers permits monopoly or cartelization with consequent artificially high prices.

Second, the enrichment of the uranium is highly concentrated, with the United States supplying almost all enrichment services. With little competition on enrichment services, the price of it is subject to artificial price increases and a wide swing in price.

Third, worldwide demand is expected to exceed supply in the 1990's, causing an upward pressure on uranium price.

The Electric Power Research Institute (EPRI) projected a real escalation rate of 1.05% per year up to the year 2000, assuming reprocessing of the fuel. They projected 2.48% escalation without reprocessing. This projection supports Mr. Kumar's 1% real escalation rate for nuclear (which is added to the annual inflation rate). The Company introduced no evidence from outside the Company that would support their projection of negative escalation in 1980-1984; and from 2.80% to .5% growth including inflation thereafter. This amount would correspond to the positive 6% to 9% increase including inflation by Mr. Kumar and EPRI. We are aware of no other experts that would support the Company's projection on nuclear fuel escalation used for this case.

XII THE ONLY COMPETENT EVIDENCE ON THE RECORD OF AN ANNUAL INFLATION RATE IS INTERVENORS.

Triple hearsay, incompetency, and a phantom witness characterize the Company's assumed annual inflation rate. The Company was unable or unwilling to put on the witness stand a competent witness or witnesses to testify to assumed annual inflation rates. Mr. Heins testified that John Andrews, a Company employee, had developed the annual inflation rates. Mr. Heins was unable to stand cross-examination on them. The Attorney General subpoened Mr. Andrews, or a person competent to stand examination on the inflation rates assumed.

Mr. James Parker was furnished as a witness, as Mr. Andrews had left the Company. Mr. Andrews had prepared the assumed inflation rates. Mr. Andrews has a Masters Degree in economics, and no work experience other than with Consumers Power for four years. (I-114A, P. 11) He never testified on rate of return. (Ibid, P. 15) Mr. Parker, who was Mr. Andrews supervisor, had obtained a Bachelor of Business Administration Degree in 1952, and no advanced degrees. (I-114A, P. 5)

Mr. Parker testified that Mr. Andrews did not derive the assumed annual inflation rates, but rather took them from a private subscription service in Lexington, Massachusetts. (Ibid, pp. 16-17) The author of the material is unidentified; hence, we do not know what qualifications, if any, the author had to make the projections. Thus, the basis for the projections could not be cross-examined.

In contrast, Dr. William Belmont, an economist with extensive credentials including university teaching and employment with the Federal Reserve System, at 69 T 7005, 7006, set forth his projected annual inflation rates: 8% for 1980-1985, and 5% thereafter. Dr. Belmont stood cross-examination. Since Dr. Belmont's inflation rates are the only competent evidence regarding the same on this record, his annual inflation rates should be adopted.

XIII. SUBSTANTIAL, MATERIAL, AND COMPETENT EVIDENCE ON THE WHOLE RECORD PROVES THAT THE INCREMENTAL COST OF CAPITAL FOR A NUCLEAR PLANT WILL BE AT A HIGHER RATE THAN FOR A COAL-FIRED ADDITION.

One of the more important inputs into this comparative economic analysis is the incremental cost of capital assumed for adding a nuclear plant (Midland) compared with adding a coal plant. Consumers made no study, but rather used an assumption made in 1975 of a proposed capital structure and assumed return for Consumers Power Company. Consumers Power Company thus used this unsupported page taken out of the general standard reference data book to posit a 11.75% incremental cost of capital for both a new nuclear addition and for a new coal addition. Likewise, without having done any study in support of this figure, Dr. Hieronymous on behalf of Consumers Power Company, also assumes 11.75% for both the incremental costs of a nuclear addition and a coal addition.

Mr. Belmont, on behalf of Intervenors, used for incremental cost of capital for a nuclear addition, and for a coal addition. The essence of his testimony was that there should be a spread between the cost of the two incremental capacity additions, which he refered to as "risk premium." His analysis based on a statistical market study showed that investors were requiring an additional risk premium for the cost of capital for those utilities which were adding incremental capacity additions of nuclear power. This makes a great deal of common sense in the wake of the three-mile Island accident (TMI) and its impact on investors. More-over, Dr. Hieronymous admitted under cross-examination that all other things being equal, under traditional economics (with which he did not disagree) a more capital intensive project in relation

to existing rate base would command an additional premium by investors because of the risk it imposed should the project either not be completed, or the plant either not function at all or not function properly. (81 T 8365) Thus, even where there are all coal additions, where a $2 billion expansion amounted to 50% of the rate base, and a $4 billion expansion to a 100% increase of rate base, the latter would command an additional premium. Although Dr. Hieronymous did not disagree that there should be an additional risk premium for capital intensive projects, he failed to include it. Likewise, the company failed to include any reduction for incremental cost of capital for the coal plant for the approximate 50% of the capital costs attributable to scrubbers which could be financed under pollution control bonds sold at a reduced rate of interest. All of these considerations dictate that even if one used 11.75% cost of capital for the coal plant, that the incremental cost of the nuclear addition should reflect a risk premium spread added on to it.

XIV. SUBSTANTIAL, MATERIAL, AND COMPETENT EVIDENCE ON THE WHOLE RECORD DEMONSTRATES THAT CONSUMERS POWER COMPANY UNDER STATED THE FULL COST OF NUCLEAR INSURANCE IN ITS BREAK EVEN ANALYSIS

Consumers Power Company, in another shortcut method in its break-even analysis, included a present worth component for nuclear insurance. This can be seen in the equation set forth on S-49 in the present worth amount of $115.5 million. This was done rather than running the cost in its fixed charge rate for each operation of the program to determine the total nuclear insurance cost. However, the company testified that the cost it did include would amount to .42% in this fixed charge rate. (I-124, P. 108) The intervenors used .50% as the appropriate insurance amount in their fixed charge rate. (73 T 7561) In rebuttal, Dr. Hieronymous used .42% in the fixed charge rate for his analysis, stating that there were no other unaccounted for nuclear insurance costs. This simply misstates the record.

John Ireland was the insurance coordinator in Consumers Power Company who developed the $115.5 million insurance amount that was used in the break-even equation. Mr. Ireland testified that if there were a nuclear accident outside the state of Michigan, Consumers Power Company would be liable for an assessment of up to $15 million. (Exhibit I-131, P. 27-28) Secondly, if the other utility at which the accident occurred were a member of NML, Consumers could be assessed up to 14 times the annual NML premium which amount would currently equate to $21 million. (Exhibit I-131, page 34) Further, if there were another accident in a separate policy

year Consumers could be assessed up to 14 times the annual premium again. (Exhibit I-131, P. 35) The potential for exposure to this 14 times annual premium for NML was not figured into the insurance cost of $115.5 million. (Exhibit I-131, P. 36)

Also for NEIL, Consumers Power Company could be assessed five times the premium which would amount to $8.45 million. (Exhibit I-131, P. 37) This assessment could also be levied in two consecutive years if there were incidents in both years. (Exhibit I-131, P. 38)

Accordingly, Consumers Power Company has omitted the possibility of assessments for the two premiums during each of the operating years of the reactor, that is, 34 years. Mr. Kumar, who was unrebutted on this point, quantified conservatively this additional exposure to .08% additional on the fixed charge rate, for an appropriate fixed charge rate for nuclear insurance of .50%.

XV. THE COMPANY SIGNIFICANTLY UNDERSTATED THE AFUDC RATE IN "TO GO" COSTS, USING A RATE LOWER THAN THEY ARE CURRENTLY USING.

In arriving at a $3.1 billion total project cost for Midland, the Company computed the AFUDC component by using a rate of 8 1/2%. The 8 1/2% is an understated amount for an economic analysis, since the AFUDC should be computed at the incremental overall cost of capital, for that is the actual cost of money that should be capitalized to the project. In fact, the Company is already book AFUDC at least at 8 3/4%. (61 T 6105) The Company used 11.75% for the cost of capital (found in the fixed charge rate), and Intervenors used 12.57% for nuclear (73 T 7534). At $3.1 billion total project, 8 1/2% AFUDC totaled $925,445,000. Calculating AFUDC only on "to go" cost using the Company's $2.174 billion total capital estimate, AFUDC at 11.75% would bring the project to $3.37 billion; at 12.57% the total project cost would be $3.44 billion (Ibid, P. 7534). Accordingly, the Company has understated the AFUDC by $340 million using their total project cost capital estimate of $2.174 billion.

XVI. THE COMPANY FAILED TO REDUCE THE DISCOUND RATE WHEN THEY ASSUMED THE INFLATION RATE DROPPED.

The Company set its discount rate equal to the overall cost of capital it used, 11.75%. The Company's assumed objective figure for cost of capital was unrelated to its assumed annual inflation, and remained constant at 11.75%.

The Intervenors, through Dr. Belmont, also conservatively set the discount rate equal to the overall cost of capital. The lower cost of capital for coal of 12.20% for coal (rather than 1[illegible]7% for nuclear) was used. Since Dr. Belmont testi[illegible]t incremental cost of capital would decline with a decline [illegible] the inflation rate, the discount rate fell to 10.20% in 1986 when inflation reduced from 8% to 5% per annum. (I-148, Sch 1; 69 T 7007)

XVII THE COMPANY'S ANALYSIS FAILED TO INCLUDE THE DECOMMISSIONING COST OF $165 TO $180 MILLION AS COST FOR THE MIDLAND ALTERNATIVE.

A significant cost unique to Midland is the cost of destruction of the power plant in order to eliminate the environmental/health effect of the radioactive structure at the end of the plant's useful life. This "decommissioning" and its costs, to the extent they are predictable, are substantial.

The Company's most recent estimates put decommissioning at a level of at least $180 million, in 1981 dollars. (38 T 4350; 28 T 3334-36;, I-39). Mr. Heins believed his people had factored $165 million into the breakeven analysis. (Id.) He was wrong. Depositions of the people who provided the input to the breakeven analysis showed that, although a number of people believe that decommissioning costs were in, the person responsible for incorporating them in the fixed charge rate had failed to do so. As a result, the Company breakeven analysis erroneously favored Midland by at least $165 million.

Mr. Heins was also low on his decommissioning cost. Mr. Kumar, on the basis of a review of industry net salvage values running from 4.8% to 36% utilized the decommissioning cost of $180 million which the Company had estimated (73 T 7561) That translated into a -5% salvage, which when added to the Company's non-decommissioning salvage value of -5%, resulted in a -10% net salvage component for the fixed charge rate. (Id.)

XVIII. DECOMMISSIONING COST IS A COST TO ADD TO THE CONSTRUCTION COST PROJECTION.

Both Mr. Heins and Dr. Rosen's cost-benefit analysis treated Midland decommissioning as a capital charge, factored into the fixed charge rate. For Heins, (28 T 3320; 33 T 3872-74; for Rosen, 73 T 7515, I-148 S-1). There was no dispute that, in order to obtain NRC license for the plant, the Company would have to decommission it at the end of its useful life. Thus, the plant's deconstruction costs are as certain as its construction costs.

As certain, fixed costs, decommissioning can be added to the construction cost projection of the plant to obtain a total projected capital cost.

XIX DECOMMISSIONING WILL COST AT LEAST $165 MILLION AND PROBABLY $180 MILLION.

After cross-examination showed that Mr. Heins' projection for decommissioning costs was lower than the Company's official projection, Mr. Heins calculated a decommissioning cost of $165 million. (38 T 4350; 28 T 3334-36; I-39).

This was a revision of earlier Company calculations which were based on no industry experience in decommissioning a large commercial power plant. (Id.) Rather they were the judgment of Company engineers which proceeded from a Battelle Labs generic estimate for XWR's, which in turn was based on no industry experience with large commercial plants. (Id.) The Company projected a scenario of immediate dismantlement, as opposed to such alternatives as moth-balling the plant for a number of years prior to dismantlement, or permanent entombment. (Id.)

Mr. Kumar used the Company's prior projection. (73 T 7561)

XX METHODOLOGY: DR. ROSEN INPUTTED DECOMMISSIONING COST AS PART OF THE FIXED CHARGE RATE.

Dr. Rosen's cost-benefit analysis inputted Mr. Kumar's decommissioning cost as part of the fixed charge rate. (73 T 7515) This made it an annual fixed cost.

XXI METHODOLOGY: THE COMPANY'S BREAKEVEN ANALYSIS OMITTED CONSIDERATION OF THE DECOMMISSIONING COST.

Mr. Heins, on cross-examination, stated quite firmly that the fixed charge rate for Midland included decommissioning. (See supra) The Compar used that rate in a hand calculation as part of the Dow charge. and for annuities and present-worthing. (See S-49, revised) The decommissioning number was implicit in the determination of the "to go" cost which the Company equation derived by subtracting Midland hand-calculated operating and sunk costs from the coal side "package" costs. (Id.) But Mr. Heins was in error. The people he had supervised on the breakeven study had never included decommissioning costs in their calculations. Intervenors followed the trail of the omission by deposition back through the Company chain of command.

Mr. Heins assumed that decommissioning costs appeared in the Company negative 5% net salvage estimated for the plant. (See, supra). This number, he believed also included site restoration costs. (Id.)

He got the number from Mr. Lapinski who supervised the economic dispatch runs. (I-123, P. 9-12) Mr. Lapinski got his inputs, including the fixed charge rate and its negative salvage rate from Mr. Northrup, (I-116, P. 10-11, 15).

Mr. Northrup was quite clear. The negative net salvage value he provided came from the tax department (I-116, P. 16). Mr Campbell, of the tax department, was emphatic--the negative net salvage number did not include decommissioning. (I-113, P. 6-7)

Therefore the Company breakeven estimate understated Midland's capital cost by $165 million (Mr. Heins' calculation) to $18(million (Mr. Kumar's calculation). Adding that amount to the already "firm" capital costs of $3.2 to $3.27 billion, derives a projected "firm" total capital cost of $3.38 to $3.45 billion.

10/28/80

Case U-6360
Dr. Richard Rosen
Exhibit I-96 Revised

TABLE 4

TOTAL DISCOUNTED REQUIRED REVENUES
OF ALTERNATIVE CONSTRUCTION PROGRAMS
(1984-1995)

Construction Program	Millions of Dollars Discounted to 1980		Investment Cost Recovery Case	
	High Capital Cost	Low Capital Cost	High Capital Cost	Low Capital Cost
Probable Load Growth - ESRG Data Set				
A - Midland #1 & #2 rank* -	17,158 #4	16,507 #4	17,158 #4	16,507 #4
B - No Midland rank -	15,505 #1	15,505 #1	15,800 #1	15,800 #1
C - Midland #1	15,853 #2	15,651 #2	16,048 #2	15,846 #2
D - Midland #2	16,801 #3	16,351 #3	16,901 #3	16,451 #3
High Load Growth - ESRG Data Set				
E - Midland #1 & #2 rank -	21,811 #3	21,159 #3	21,811 #3	21,159 #3
F - No Midland rank -	20,450 #1	20,450 #1	20,745 #1	20,745 #1
G - Midland #1	21,015 #2	20,814 #2	20,210 #2	21,009 #2
H - Midland #2	21,845 #4	21,393 #4	21,945 #4	21,495 #4
No Load Growth - ESRG Data Set				
I - No Midland rank -	11,609 #1	11,609 #1	11,888 #1	11,888 #1
J - Midland #1 Only rank -	12,208 #2	12,006 #2	12,403 #2	12,201 #2

*The ranking labelled here is relative to other programs in the same capital cost and load growth scenarios, where #1 is the least expensive.

XXII. CONCLUSION AND RELIEF

As was stated earlier in this Brief, the Midland plant even at the Company's estimate would increase net utility plant including T&D by over 100%, while only increasing net generating capability by 19%. Moreover, it would be less expensive to ratepayers by from $484 to $1,135 million to stop Midland construction, build equivalent coal units, and even return the sunk cost of Midland back to the Company.

This is the cost penalty to go forward with Midland assuming fairly optimistic operating conditions. Should 1) Midland operate as Pallisades has (also built by Bechtel), or 2) should it shut down as TMI has, or 3) should it not run 34 years as assumed in the analysis (no nuclear plant has), but only 15-20 years, or 4) should there be high interim retirement of the plants components because of metal fatigue due to radioactivity, this plant would be an unbearable disaster financially. This is not to mention the obvious impact on rates when net utility plant is increased by more than 100% if Midland were to go into commercial operation.

The Intervenors believe that the competent evidence of record proves that Midland is a heavy loser financially, and there is no reason for any optimism regarding it in the future. We need not assess fault here. There are a variety of circumstances that have beleaguered this plant. It is clearly no

longer the same plant which original securities were approved by this Commission over 10 years ago.

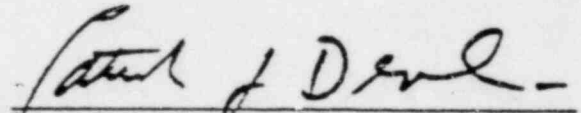
The Intervenors respectfully urge the Commission to make findings of fact so that it will appreciate the gravity and urgency of the situation. A decision that simply shirks the statutory duty and defers the question of whether Midland is economic for a future Commission to decide, may be just bequeathing to them a multi-billion dollar fate accompli, that neither that Commission, the CPCO shareholders, or the rate-payers can afford.

Respectfully submitted,

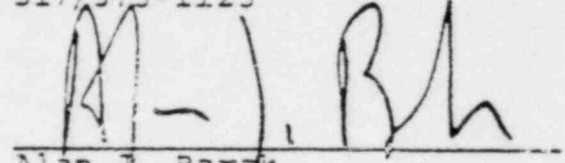
FRANK J. KELLEY
Attorney General

Hugh B. Anderson
Assistant Attorney General

Roderick S. Coy
Assistant Attorney General



Patrick J. Devlin
Assistant Attorney General
630 Law Building
Lansing, MI 48933
517/373-1123



Alan J. Barak
MICHIGAN CITIZENS LOBBY
400 South Washington
Lansing, MI 48933
517/372-7111

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