UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
CONSUMERS POWER COMPANY	)	Docket Nos. 50-329
	)	50-330
(Midland Plant, Units 1 and 2)	)	

NRC STAFF TESTIMONY OF F. S. ECHOLS
ON THE ENVIRONMENTAL IMPACT OF CONTINUED PLANT CONSTRUCTION
DURING THE NEXT YEAR AND ENVIRONMENTAL REVIEW SCHEDULE

Having both visited the site on October 20, 1976 and discussed construction practices and schedules with NRC personnel from Inspection & Enforcement as well as personnel from Consumers Power Company, I conclude that although the Midland Plant, Unit Nos. 1 and 2 are less than 20 percent complete, virtually all impacts upon the environment, due to construction, have occurred. The cooling pond has been constructed and the last remaining riprap is being placed on the slopes; equipment lay down areas are completed and in use; the sewage pipe line to Dow Chemical is nearly complete as is the water pipe line from Midland; the rail line is complete; county drains have been relocated; the preparation of the river shoreline for the intake structure is nearly complete and riprap is in place, dredging has been completed; water runoff control practices are in effect; all spoil material is being used on-site for dike construction and diversion of surface runoff; grass seeding of banks has been done and is to be repeated if a washout occurs; the batch plant is in operation with stack filters in use; road watering is used when needed to reduce road dust; screening techniques have been employed to reduce visual impacts to nearby residents.

Upon retiring from the Army, I accepted employment with the U.S. Nuclear Regulatory Commission, (then the U.S. Atomic Energy Commission) as a Project Manager in what is now the Division of Project Management. In this capacity I was responsible for the safety evaluation of the Kewaunee Nuclear Power Plant which was licensed for operation in December 1973 and for the Alvin W. Vogtle Nuclear Plant which was Licensed for construction in June of 1974. I have had primary responsibility for the safety review of the Koshkonong Nuclear Plant. I am a Registered Professional Engineer in the District of Columbia.

year was spent attending the Oak Ridge School of Reactor Technology (ORSORT) at the Oak Ridge National Laboratory (ORNL). Upon graduation from ORSORT, I remained at ORNL for an additional year as Technical Liaison Officer for the Army Nuclear Power Program with the responsibility of representing the Army's interests at ORNL. From 1958 to 1960, I was a Project Officer in the Army Reactor Branch of the Atomic Energy Commission with responsibility for managing, coordinating and technically supervising contractor activity on a research and development project leading to design of a pressurized water nuclear power plant.

After a 3-year break for an overseas tour and attendance at an Army school, I was assigned in 1963 to the Office of the Inspector General, Department of the Army, where I was responsible for inspecting the operations and safety of the Army's nuclear power plants and research reactor facilities. From 1964 to 1967, I was assigned to the Office of the Chief of Research and Development where I served as the point of contact within the Army General Staff on all matters pertaining to research and development on the Army's nuclear power plants and research reactor facilities. From 1968 until retirement from the Army in 1970, I was the Deputy Director of the U.S. Army Engineer Reactors Group, with responsibilities including operator training, nuclear power plant operation, engineering support to the operating plants, and limited research and development activity.

LAWRENCE P. CROCKER

PROFESSIONAL QUALIFICATIONS

I am the Technical Assistant to the Director of Project Management. Until August of 1976, I was a project manager in the Division of Project Management, and it was my duty to coordinate the safety evaluation of those central station nuclear power plants for which I had primary responsibility. Since assuming my present position, I have temporarily retained responsibility for certain projects, including the responsibility for the Midland plant.

I graduated from the U.S. Military academy at West Point, New York in 1951 with a Bachelor of Science degree in military engineering. I was commissioned a Second Lieutenant in the Corps of Engineers, U.S. Army. I served on active duty in the Corps of Engineers from then through August of 1970, at which time I retired in the grade of Lieutenant Colonel. My military experience included assignments as platoon leader, company commander, and battalion commander of various engineer units; overseas duty in Korea, Japan, the Azores, and Thailand; and service on the Army General Staff. During my military service, I attended various Army schools including the Army Command and General Staff College.

In 1955, I entered Iowa State College, from which I graduated in 1956 with a Master of Science degree in Nuclear Engineering. The following

checked for adequacy and accuracy of placement prior to concrete pours around these materials. For the concrete pours themselves, the maximum rate of pouring is limited by the curing time required for that concrete previously placed. Welding and general erection of structural steel is largely a sequential operation wherein certain activities must be accomplished before others can be initiated.

Working conditions and the project status also have a considerable influence on the rate of construction placement. Where working space is limited, where the working conditions or the work sequencing must be closely controlled, or where special skills are necessary, attempts to speed up construction by employing more workmen, or by going to overtime or multiple-shift operation could actually be counter-productive. This becomes extremely crucial toward the end of a project when control of workmen becomes difficult at best, where the workmen are operating in relatively limited space due to previously installed work, where the services of the most skilled workmen are required, and where many of the activities, of necessity, must be accomplished sequentially.

The present schedule for the Midland Plant calls for a Unit 2 fuel loading date in November of 1980 and a corresponding date for Unit 1 in November of 1981. Thus, the utility currently plans about 47 months (from December 1976) for completion of construction of Unit 2 and an additional 12 months for Unit 1. To accomplish this, work at the site currently is proceeding on the basis of one full shift plus a partial shift. Thus, Consumers Power Company already is employing a portion

Should an order be issued to suspend further construction, some period of time would be required to close down the project. In addition to personnel related matters such as laying off members of the construction force and termination of subcontractor effort, specific efforts would be required to bring the construction activity to an orderly close such that construction materials could be protected from the elements and so that work now in place could be protected. Further, it should be recognized that continued effort would be required to maintain the integrity of the various protective covers and to assure that the construction site is not subject to vandalism. Thus, the shut-down of construction should not be viewed as an instantaneous occurence. Rather, it is a gradual process which would require a minimum of several weeks to accomplish, and which ultimately would result in some residual, continuing effort to provide necessary maintenance and site protection services.

For a suspension period on the order of nine months, I would estimate that about three to four weeks would be required to close down the present construction activity in a condition that would allow reasonable protective measures to be taken. The bulk of the work force probably could be disbanded about two weeks following notification of the suspension, with a slower personnel reduction following that period, ultimately resulting about two months after issuance of the suspension order in a residual force of perhaps twenty persons to handle continuing maintenance and protective services. These persons also would have to receive and store those materials and supplies that are now on order for

which delivery could not be cancelled. It should be noted that this shut-down of the construction activity really could be carried on during the initial period of suspension and could be provided for in the suspension orders. It does not have to be provided for as a separate period of time.

The time required to re-start the construction following a nine month suspension would be largely dependent upon the state of the nation's economy at the time the suspension order is lifted. While re-mobilization of common laborers should be relatively easy to accomplish, it is likely that a period of several months would be required to obtain the services of skilled workmen such as welders, pipe-fitters, and riggers. I would not expect skilled workmen to remain in the vicinity of the plant waiting for the construction to resume. Rather, it would be more likely that they would scatter across the country to other jobs. Thus, at the time the suspension was lifted, I would judge that a period of perhaps four to six months would be required to locate the requisite skills in the proper numbers to resume construction efforts.

In addition, subcontractors more than likely would be committed on other projects and would not be immediately available to start work at the Midland site. Both equipment and personnel probably would be committed elsewhere. In addition, a finite time obviously is involved to advertize for the necessary subcontract work, select the subcontractors, negotiate terms for the subcontract effort, and assure that the subcontractors meet the quality assurance requirements for the work.

In view of the above, I thus would judge that a period of four months is an optimistic estimate of the time required to get the construction effort underway again following a nine month suspension. The re-mobilization time easily could be more than four months if the economy is booming at that time and could extend to six months or more.

I turn now to the question of whether time lost during a suspension could subsequently be made up. Under certain circumstances, it is possible to speed up construction work by taking such measures as adding additional personnel to the work force, using extended work hours beyond the normal work shift, or going to double-or multiple shift operation. Within limits, by employing such methods, it would be possible to make up for construction time lost. My experience has shown, however, that for a variety of reasons the additional work accomplished during a given period of time does not normally bear a one-to-one relationship to the additional effort applied. Thus, two weeks worth of construction progress by a given size work force usually cannot be accomplished in a one week period simply by doubling the number of workers or by going to a two-shift operation. Problems such as materials scheduling and handling, equipment breakdowns, and personnel utilization generally manage to make the total effort less efficient than for a smaller work force over a longer period of time.

Certain construction activities are critical to the overall project scheduling in that they must be accomplished prior to other work. For example, reinforcing steel and embedded items must be placed and must be

of the possible alternatives to speed up construction.

As I stated earlier, following a construction suspension of nine months, I estimate that a period of four to six months would be required for remobilization of the construction effort. Thus, a construction suspension of nine months entails a total delay on the order of 13 to 15 months. This represents nearly one-third of the presently scheduled time remaining for completion of Unit 2. In my judgment, it would be impossible for the utility to make up for a construction delay of this magnitude, particularly when they already are attempting to accelerate the rate of construction placement by employing more than a single shift.

Considering the present stage of construction, the utility could, in my judgment, accelerate the rate of placement of construction by going to multiple-shift operation or by employing additional workers on each shift. Following a construction suspension and subsequent remobilization, this option would still be available. Such efforts probably would enable the utility to complete the construction in a shorter period of time than if they continued with essentially a single-shift operation. However, it should be noted that in accordance with the present schedule, Unit 2 of the Midland Plant is to have fuel loaded in November of 1980 and is to be ready for commercial operation in March of 1981. Any significant delay in the construction schedule thus would cause the unit to be unavailable to help meet the 1981 summer peak load for the utility. While the possibility exists for reducing the impact of a 13 - 15 month delay on the commercial