January 29, 1948

Mr. S. R. Sapirie
c/o Mr. Kenneth A. Dunbar
Area Manager, Dayton Area
United States Atomic Energy Commission
P. O. Box 66
Miamisburg, Ohio

Dear Mr. Sapirie:

In response to your request that I submit a more detailed analysis of various conditions at Unit 6 than was contained in my letter to Mr. Dunbar, dated January 24, 1948, I submit the following. Much is necessarily a reiteration of the contents of that letter.

The following general considerations are to be kept in mind:

(1) All calculations are based on full, one shift operation with a five day week, producing the same top level as can be produced in one shift at Unit 5.

(2) The cost of buildings, equipment and stock to begin operations is exactly the same for each condition I will discuss.

(3) Any standby condition means that additional personnel, sufficient to raise the numbers employed up to that required for full one shift operation, must be recruited when the emergency arises. This is one of the most difficult problems of our work. Technical personnel is always scarce,- more so now than ever. Non-technical personnel is fairly readily obtained now. In an emergency, the supply is far short of the demand. To recruit all the personnel for full, one shift operation would probably require at least a year, if one were lucky. The clearance of any employee then requires three months, on the average, to which one must add, if he is a technical employee, at least two months more for training. One may assume waiving all but perfunctory clearance, in an emergency, but the training period is inescapable. Assignment of enlisted personnel to the Unit 6 area, in an emergency, would help the non-technical, and partially, the semi-technical situations. It would be of almost no value in making up the deficit of technical employees.

(4) It has been argued that the personnel of Unit 5 could be moved to Unit 6, if Unit 5 were destroyed. This is obviously without merit. People are more destructible than plants. A large fraction of any survivors might well be unwilling to risk another similar experience.

(5) To prepare Unit 6 for any condition will require temporary transfer of some personnel from Unit 5. For conditions I and 32 the number transferred would have to be a large fraction, perhaps one-third, of the operating personnel of Unit 5. This would mean diminished production. It also implies that said persons are willing to be transferred. For conditions III and IV the number that would have to be temporarily transferred would be negligible,- say five or six. A very few employees of Unit 5 will have to be permanently transferred in any case. Travel and subsistence costs for such loaned employees would be on Unit 6 construction.

(6) The final choice cannot be made unless the philosophy behind Unit 6 is defined. Unit 6 may be built to (a) back up Unit 5 in the event of destruction of this facility, or (b) to provide added production, or (c) both. Lacking definite information, I will assume that only case (a) is now being considered. However, if either cases (b) or (c) are correct, then it is even more imperative that only conditions III and IV be considered at all.

Let us now consider specifically the four conditions.

Condition I.

This may well be called "Dead Standby." The plant is built in every detail, including complete installation of apparatus and equipment. A stock of supplies sufficient to begin operations is on hand. All machinery is in heavy grease, all lines drained and all delicate instruments are "canned," i.e., sealed in airtight containers with silica gel desiccant. Only a guard force is on hand.

(1) The cost of operating would be about $200,000 annually. Ninety percent of this would be for the payroll and payroll incidentals. There would be fifty high type guards and six communications men. The balance would be for necessary costs for the guards, upkeep of say two cars, necessary travel from Unit 5, etc. In addition, the depreciation would amount to nearly $400,000 annually. This is based on the depreciation factor common to chemical companies and a rough estimate of the cost of the plant and equipment.

(2) All of my best men are emphatic that at least six months would be required to get into full operation from such a condition, assuming the buildings were not in too bad a shape, and assuming nearly all the personnel was immediately available.

(3) Special comments.

(a) Without rather frequent inspections the canning of instruments might fail without our knowledge and the instruments would be ruined beyond repair before the fact was discovered. Even intricate glass equipment may crack on standing.

(b) It seems extraordinarily wasteful to invest what amounts to about $600,000 annually for such feeble insurance.

Condition II.

This we like to call "Cold Standby." The fundamental conditions are like condition I. However, the plant is maintained in *good* condition and there is no canning *or* heavy grease. Instead, all machines, motors, etc., are turned over at regular intervals, delicate instruments are inspected and repaired regularly, the power plant is run at a level to prevent freezing and permit comfortable working, etc. The chemical equipment itself cannot be used because this would necessitate the institution of extensive health measures and subsequent decontamination would be impossible. Furthermore, this would require the presence of a large number of technical personnel.

(1) The cost of operating would be about $650,000 annually made up of a payroll *sf* about $400,000, costs incurred on behalf of the 114 employees involved, supplies for their use,- maintenance and otherwise,- travel, etc., from Unit 5, costs of communications, additional personnel in the business end *of* Unit 5 to care for the additional load of Unit 6, etc.

(2) Of the 114 personnel, five would be technical, six semi-technical and 103 non-technical. The breakdown is as follows: - one plant manager, one nurse, *sixty-two* guards, six communications men, one security officer, two technicians for health electronics instruments, two technicians far general electronics instruments, three tap notch technical employees (chemists or chemical engineers), one safety officer, two clerks for purchasing, stores and accounting, one personnel officer who could also keep the time records, two stenographers, two drivers, five janitors, one telephone operator, two cafeteria workers, one plant engineer, five firemen, one master mechanic and about twelve craftsmen *of* various descriptions.

(3) It would require at least five months to get into operation from this condition if all required personnel is immediately available. This figure has been checked in two ways by several of our best men. The figure guessed at in my letter of January 24th was two So three months but I failed to bake account of what Dr. Burbage calls "the conditioning period." It is our experience, whenever new "elephants" are broken in, a period of at least three months is required before their performance is steady and predictable. Ye do not know why this is so, but we have observed it every time.

(4) Special comments.

(a) From our experience it is practically impossible to get and keep technical men unless they are working full time on their chosen specialty. The same I a true of better class semi-technical and non-technical employees.

(b) The only thing the Government would gain from this condition is that the physical condition of the plant would be assured. There would only be one month gain in time of going into operation and it would cost $450,000 more *a* year than condition I to bring this about Again, we think this very costly and ineffective insurance. If it is visualized that Unit *6* would produce in

any case in later years, it would seem wiser to have it produce immediately or build it later when such production would be needed.

Condition III.

This we have agreed to call "Hot Standby." The plant is operating regularly in every part but ah such a level that this is just made possible. In other words, the level is such that further reduction in personnel is not possible if the plant is to produce at all. Our carefully considered opinion, based on extensive experience, is that thirty-five per cent of full, one shift level is the proper figure. Following are the statistics.

(1) Annual cost: - about $2,850,000.

(2) Personnel required: - ninety-air technical, ninety-seven semi-technical, 363 non-technical, *or a* total of 556.

(3) Time to produce: -

(a) Immediately for thirty-five per cent of full, one shift.

(b) One week for fifty per cent of full, one shift, if we work seven days, or for sixty per cent if, in addition we worked a ten hour day. (Obviously, *Chis* last would only be a short term emergency.)

(a) One week for one hundred per cent of full, one shift, if the additional personnel were immediately available. If the additional personnel had to be recruited, this time would depend on the speed of recruiting and training. We would need for steady, full, one shift production on a five day week and an eight hour day, seventy-one more technical personnel, forty more semi-technical personnel and thirty-three more non-technical personnel. A six day week would reduce all these additions by about twenty per cent.

(4) Special comments.

(a) We have here all the factors for obtaining and holding first class personnel.

(b) We have here as nearly perfect "insurance" as is customarily carried. In fact, we feel more would be too much, unless the output is desired now.

(c) This condition provides a perfect "hard core" for training and indoctrinating the additional personnel for full operation even while production on. Conditions I and II lack this feature all together.

(d) If the additional output will be needed next year, it will be available.

(e) Although the cost is about four times that of condition II, there is no wastage. Effectively, there is essentially no worthwhile gain from condition II. It is, practically speaking, all wasted.

(f) Having trained personnel at both Units 5 and 6 would give us a cushion against unexpected losses at either site and insure the production set for each place.

Condition IV.

Full Production. The advantages are the same as listed under condition III. However, we feel that it is unnecessary unless the full production level is desired now. Statistics follow.

(1) Annual cost: - about $3,550,000.

(2) Personnel required: - a total of 700 divided as follows: 167 technical; 137 semi-technical; 396 non-technical.

(3) Time to produce: - one hundred per cent immediately.

Additional Comments.

The question of a supply of irradiated soda pulp has not yet been discussed. Under conditions III and IV a supply sufficient for the designated levels will, of course, be available Conditions I and II would be useless unless the supply from Unit 5 could be recovered or until sufficient material arrived from Hanford. The normal shipments to Miamisburg would, naturally, be diverted so there would be a delay from this cause of, at most, one month. We do not favor extensive stockpiling of irradiated soda pulp unless this is done in a pile. The monthly depreciation is roughly fifteen per cent,- a tremendous loss when one has many units on hand. On the other hand, stockpiling in the pile produces very hot slugs, suffering of course from the fact that the silver impurity is also hotter.

One point brought out in the planning conference at Miamisburg today, and agreed to by all, was that some housing must be considered by the Atomic Energy Commission in connection with the plant proper. Search shows that Marion could not possibly house but a tiny fraction of the people we would have to move in. The same would be true of a plant located anywhere but close to a town of at least 250,000 inhabitants. We propose recruiting non-technical and most semi-technical employees near the site. All technical and a few semi-technical and non technical employees would have to be moved in and find housing. I believe, as a first approximation, that about eighty houses and a dormitory for perhaps 100 people should be included in the plans. Without such facilities, I fear our whole recruiting program will be in very great danger. This might be considered an added argument for condition III. The housing facilities would all be used immediately. Under condition II, less than five per cent would be used, yet they must be available immediately or recruiting will bog down in time of emergency.

[redacted]

Summing up, we most strongly urge the authorization of condition III. If the Atomic Energy Commission deems such insurance or added production necessary, that is the form we are certain it should take.

Very truly yours,

M. M. Haring
Laboratory Director

MMH:eB

Approved by:

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Carroll A. Hochwalt
Project Director

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