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Report of the Biogas Panel

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The National Academy of Sciences Biogas Advisory Panel met with the Egyptian team members in Cairo, April 3, through April 7,1982.

The biogas team has continued to make good progress and has met planned goals on time. Well perpared reports and technical publications document the effort so that the panel has been well aware of the progress. Frequent in-person communication between team members and panel members has been made when team members presented papers at important conferences in the U.S. The personal communication has been valuable on both sides and has enhanced the progress of the project.

Strong leadership from the principal investigator Dr. El-Halwagi has kept this project moving even under some adverse conditions such as lack of local money, lack of incentive money for researchers and lack of technical instrumentation.

The industry, dedication and personal sacrifice of Dr. Abdel Dayem is to be commended. He has really made the village implementation phase of the project move forward in a meaningful and productive way. Spending so much time in the villages working directly with the construction was a necessary and vital ingredient of this part of the project.

The panel is aware of an increasing problem that may seriously hamper the future success of this project. There is a growing dissatisfaction because the expected incentive payments to the investigators at all levels have not been paid for about 18 months. This negative impact may soon counteract all of the

positive enthusiasm that the team has had in the project. This vital problem of monetary incentives is a matter to be solved quickly by the coordiated effort of the ASRT project managers and the AID coordinator. We do not pretend to know how to solve the blockage in the suppl, line of funds, but we do see it as a problem that can cut this hitherto successful project apart and may even kill it.

Smooth, flexible and yet fiscally responsible management of the larger Science and Technology project is developing. The improvement in this area will help all projects and the biogas project in particular.

The plans for the next year may involve a change in emphasis from a closely held project in the NRC to perhaps a more widely dispersed project. At this juncture the socio-economic parts of the project become much more important than the technical aspects.

General points to consider relative to the socio-technology of Biogas transfer.

1. Substantial success has already been achieved in design, construction, testing and successful working of the physical and biological engineering requirements of early biogas demonstration. This can be referred to as Demonstration A- Technical feasibility. It is now time to allocate higher priority attention on Demonstration B- social cultural feasibility.

2. One good way to give the B- Demonstration a booster thrust will be to remove the protective low profile cover from the project and proceed in a variety of planned ways to give the project selected and directed publicity. Official statements, articles, papers, visits of dignitaries, write-ups in official development publications etc.

3. In guiding the B- Demonstration dealing with social-cultural feasibility the biogas team of NRC must retain the principal advisory and administrative role through the remainder of phase II and for appropriate portions of a phase III.

4. The social-cultural feasibility will require a political policy approach to determine who can obtain what kind of working relationships and with whom to advance the common interests and concern of the people.

5. The transfer of appropriate technology can only be done in manageable units in accordance with capacities to obtain cooperating agreements, provide or obtain needed supplies and materials, provide training and supervisory skills to local personel.

This definitely implies a phased developmental approach in which demonstration units strategically placed carry the role of demonstration units in regional locations to systematically and gradually validate feasibility issues.

6. The principal biogas team from NRC should assume the role of trainer of trainees rather than trainers of the masses. This ensures the success of the program and will stay closely aligned with basics and fundamentals critical to its success.

7. The biogas team and the NRC should explore outside for the appropriate agency or consortium of agencies who could and/or should assume responsibility for finding, creating or utilizing appropriate infrastructure at the Governorate down to the village and household level to become participants in a biogas developmental scheme.

8. The principle of self help should serve as a strong guiding philosophy at the political sub-unit levels and especially at the village, neighborhood and household levels. Involving the people concerned and affected in the decision processes will invoke sensitivities to factionalism, political and social differences and the myriad of other opportunities or constraints to be accounted for.

9. Give early thought to mobilizing a task force which might be given the assignment of producing the first draft outline of a national demonstration program on the application of appropriate biogas technology.

10. A second task force might be selected a few months later to review and evaluate the working assumptions and implementing strategies of the first group, obviously some overlapping between the two groups would be desirable but not too much.

11. Donor agencies, Embassies and Ministries of the Egyptian Government should also be cultivated, contracted and be kept informed.

12. It is important that a group of at least 3 to 4 high level people from various appropriate ministries be assembled and be taken to Omar Makram village immediately. There they should be given a complete briefing about the work involved in the installation of the biogas units. This should be done before all of the digesters in Omar Makram are charged with manure. For the purpose of comparison, this group should also be taken to El-Manawat to visit the 2 digestors that are already in operation.

The selection of the members to the group should be based on the premise that this group will be incorporated into the biogas task group suggested earlier in this report. Such a biogas task group may eventually be given the responsibility of forming a central biogas directorate under an appropriate Ministry with responsibility for developing guidelines and policy to disseminating biogas technology into various villages in Egypt.

13. A time table for producing a technology transfer proposal that could represent the latest and best state of the art of this process should be targeted for May - June 1983.

The Fundamental Microbiology and Pollution Control groups are encouraged to investigate the following aspects of biogas production from wastes, for which the answers are not available.

a) What is the composition of the volatile acids mixture in the digested slurry ? From the data presented in the reports a high concentration of volatile acids is present in the digested slurry and is indicative of suppressed digestion. If these acids are able to be digested further, an additional amount of gas can be realized.

b) What are the conditions under which the volatile acids remaining in the slurry can be digested ?

c) Will seeding of the feed with a "well-digested" slurry (e.g. concentration of volatile acids less than 100 gm/L) help in lowering the volatile acid concentration of an otherwise less optimally performing digester ? (e.g. digested slurry containing a volatile acids concentration of greater than 1000 mg/L).

d) What is the volatile acid composition in the digested slurry of the digester fed with algae ? Is the enhanced gas production in the algae fed digester due to the stimulation of methanogenesis or is it a result of the digestion of the supplemental organic matter in the algae ?

e) What are the relative numbers of methanogens in a well digested slurry (volatile acid concentration of less than 100 mg/L) in contrast to a poorly-digested slurry (volatile acid concentration of greater than 1000 mg/L) ?

f) An assumption that two-thirdsof the dung production by animals would be available for digestion in a biogas plant was made in the report. Was this assumption tested ? Data should be collected by confining the animals to the barn for the entire day and these data should be compared with those obtained with the normal confined period.

g) The work related to scum formation in digesters and possible means of reducing it should be given a priority. A knowledge of the character and basic mechanisms involved in the formation of scum will be of great value. Possible chemical and biochemical means of reducing the scum layer will aid in decreasing the dead spaces in the digester.

Tnis project has produced very good results and is on schedule. The monentum needs to be maintained and the future results will greatly benefit the people of Egypt.