March 30, 2009

Dr. John W. Nielsen-Gammon
Acting Executive Associate Dean
Texas A&M University
College of Geosciences
Room 202, Eller O&M Building
College Station, Texas 77843-3148

Dear Dean Nielsen-Gammon:

Please find attached the report from our External Review Committee for the Geochemical and Environmental Research Group (GERG), Texas A&M University.

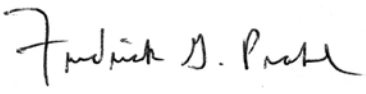
We provide in the report an opening statement of problems we found followed by a discussion of our understanding of future prospects for GERG. Then, we address the five questions you posed. This section is followed by statements of 'Findings' and 'Recommendations' for GERG Ocean Sciences division, for GERG Environmental Chemistry division, and finally, for GERG in general.

We hope this report answers your needs.

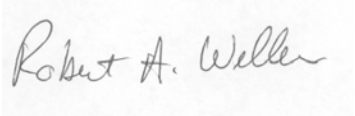
Sincerely yours,

Kent A. Fanning

Fredrick Prahl



Robert Weller



GERG External Review Committee Report

Kent Fanning – University of South Florida
Fredrick Prahl – Oregon State University
Robert Weller – Woods Hole Oceanographic Institution

Statement of Recognized Problems in Need of Resolution

Predicting the future of GERG presents a challenge, in part because faculty in the College of Geosciences at TAMU lack knowledge of GERG's mission and existing strengths. In some key ways, GERG has the potential to provide significant support to oceanographic research and education in at least four critical areas: (1) analytical capabilities for hydrographic parameters, trace metals, and natural and pollutant organics in the environment and organisms, (2) development of moorings and other equipment to facilitate study of oceanographic and atmospheric processes, (3) the staging required for marine and other field research utilizing large equipment, and (4) the education and support of graduate students with interests in environmental study. Our brief on-site review revealed that the Department of Oceanography needs but cannot easily find and/or access equivalent support in each of these four areas elsewhere within TAMU. The mooring/buoy group at GERG is focused on local coastal or shelf waters and has fielded moorings for use off Africa. While some of the physical aspects at the GERG facility, e.g., its machine shop or its analytical instruments, need upgrading or replacing, its existing infrastructure still has much to offer faculty within the Department of Oceanography and within other programs at TAMU.

Yet there seem to be fundamental 'disconnects' or multi-component differences of opinion between GERG and the Department of Oceanography, their closest entity in the College of Geosciences, for reasons that are not entirely clear. First, the 4-mile separation of GERG from the main TAMU campus certainly plays a role. But, the physical separation is apparently not the only reason. Information gathered during individual meetings with personnel from GERG, the Department of Oceanography, and the College of Geosciences indicates that the problem is an organizational one. GERG scientists felt that they do not receive enough credit, for example in the form of partial FTEs, for the teaching they do for the Department of Oceanography. Both groups did acknowledge that GERG scientists served on student committees, but GERG scientists would like formal recognition, perhaps in the form of some salary support each year and the right to serve on, or even chair, specific committees. The Department of Oceanography and the College of Geosciences were not emphasizing the goal of developing such functionality in their vision however, perhaps because of serious budget constraints.

Second, it was claimed that GERG scientists did not publish their findings. Yet the data we received for review indicated that GERG scientists' publications were rated highly enough to have a range of H-factors as respectable as achieved by the Oceanography faculty and that, of the eight graduate students who were co-authors on GERG publications, seven were from Oceanography. This discrepancy suggests a major need for more contact between the groups!

Third, a serious difference in point of view concerns technical support. Oceanography apparently lost its marine technicians when the *Gyre* was sold, and GERG acquired some of them. However, those individuals are now supported solely on grant and contract funds, which means that payment for their services must be received or GERG loses money. Oceanography

personnel said that there were "billing problems" or that the technical support services were too expensive. GERG personnel, on the other hand, said that they were providing a number of such services for free (such as on a recent Antarctic expedition) but that there now exists unavoidable financial constraints to meeting any more of Oceanography's needs without some type of fundamental restructuring of its administration and support.

Fourth, a few Oceanography faculty are strongly involved with GERG, but the majority of those who are interacting, do so only rarely and not on a permanent basis. The interaction is now through the occasional sending of students to the remote GERG campus to work on specific research problems.

And fifth, we noted uncertainty on what GERG's mission ought to be, given the type of funding it now typically receives. Apparently GERG once managed large multi-investigator grants focused on important research questions, and Department of Oceanography faculty then participated in such endeavors. Now, however, opportunities for those grants appear limited. GERG has shrunk in size from ~140 people to around 40, and much of their support derives from contracts designed to provide data and services to outside agencies. GERG scientists expressed a desire to do more pure research but realized that their well-established contract work was a necessity to pay their bills given their current administrative management. Oceanography faculty, even those who interacted strongly and received considerable benefit from GERG, stated that this unit should essentially give up its applied research. This action would seem to be a serious sticking point, and must be resolved if GERG and the Department of Oceanography are to successfully maximize their cooperative potential.

Two final disconnects or differences of opinion between these groups concern financial matters. There is a residual animosity about the "debt" that GERG acquired some time in the past. Estimates of the magnitude of that debt differed by several fold, depending on who provided the scenario. Also, there is residual animosity about the justification for allocation of university FTE funding to GERG. Apparently an Oceanography faculty salary was bequeathed to GERG some time ago so that the member could deal with its independent fiscal management problems, including repayment of its debt. When that job was finished and that particular faculty member in charge of GERG retired, those salary funds apparently remained with GERG to pay for its Director's salary. If correct, this supposition, along with the issue of GERG debt, is used by some Department of Oceanography faculty or College administrators to argue against GERG receiving any more University support.

Future Prospects for GERG

The short term (next 3-5 years perhaps) prospects for GERG seem reasonably good, mainly because state funding (e.g., from the Texas General Land Office or Texas wildlife agencies) does not seem in danger of ending anytime soon. These sources, in all probability, will continue to provide a modicum of support so that GERG will continue to function more or less as it now does. As before, there will be possibilities for Oceanography and its graduate students to get involved if their research interests relate well to ongoing GERG studies. But, the longer-term prospects are quite tenuous. *If the disconnects or differences of opinion between GERG and Oceanography outlined above are not mitigated, the full potential of GERG as a valuable support arm of Oceanography may never develop.* This consequence would be quite unfortunate

as the Department of Oceanography at TAMU could well miss an excellent opportunity to fully participate in national expansions of ocean observatories or coastal ocean observing systems. GERG has considerable experience with *in situ* instruments, and Oceanography would likely have to re-learn what GERG already knows about collaborating and leading such activities. A group like GERG is much better equipped organizationally to conduct long-term monitoring than an academic unit. Furthermore, the analytical capabilities of GERG are strong now. Since it is usually wiser to build from strength, those existing capabilities should be upgraded rather than abandoned and perhaps rebuilt independently on the main TAMU campus. Therefore, if viable and meaningful cooperation between GERG and the Department of Oceanography is to occur, additional University resources will have to be found for that unit, ideally in a way that does not "subtract" resources from either group.

Many approaches might work. Selected GERG scientists might become research Oceanography faculty, perhaps receiving 3 months salary support from TAMU annually and having full faculty rights and privileges. The GERG Director should be a fulltime, 9-months academic faculty appointment and perhaps even serve as Assistant Department Head in Oceanography. If finances permit, the Department of Oceanography could also be given the opportunity to hire one or more new faculty with the stipulation that these individuals would have offices and lab spaces in GERG. Facilities at GERG could be upgraded with University funds, either as outright grants, as loans to be paid out of future contracts, or as a combination of both. These suggestions are just posed as ideas. But, a final strategic plan for the long-term health of GERG (and the Department of Oceanography!) must be defined if GERG and the Department of Oceanography are ever to resolve their differences and interact beneficially with one another. A very positive outcome seems quite possible but will undoubtedly prove to be an arduous task, with compromises required of all parties involved.

A final note on the future concerns the current senior leaders of GERG. They are nearing retirement age and will need to be replaced, probably in the next 3-5 years. Replacements should be made with the most creative, ambitious, and capable scientific leaders that can be found. Improvement in GERG's current situation will no doubt be greatly enhanced if changes such as those suggested above are enacted, making this unit a far more attractive one to lead.

Response to Five Questions Asked by the Geosciences Administration

1. How should GERG maximize its value to the research, teaching, and engagement missions of Texas A&M University?

GERG is based on special capabilities in two main areas: the legally defensible measurement of priority pollutants in environmental samples and the fabrication, deployment, and operation of oceanographic buoys, moorings, and related instrumentation. Both areas have the potential to be of great value to TAMU if GERG and relevant departments on campus were better integrated in terms of staff appointments and utilization of physical infrastructure.

The environmental chemistry program at GERG now provides, and seems to have provided since its inception, a valuable service to the State of Texas and to Federal agencies such as the US Fish

and Wildlife Service. The product of this service helps to fulfill societal needs, which is an important part of the mission for a publically owned, land grant – sea grant university such as TAMU. The analytical facility at GERG appears to be a well-established, major contract laboratory for measurement of environmental contaminants. Given a strong administrative tie with TAMU, it offers 1) an opportunity for training of students interested in environmental assessment and management careers as well as 2) a viable analytical resource for fulfillment of contract obligations but also specific, basic research needs.

Similarly, the ocean observing work done at GERG provides a valuable service to the State of Texas. It also now provides the opportunity for student training in applied science and an excellent selling point for a Master's program in operational oceanography that is now being proposed.

To strengthen GERG and maximize its value to TAMU, we recommend better administrative integration with the College of Geosciences and a boost in financial support from the university. An additional FTE (beyond the one now provided) should be allocated to GERG and distributed appropriately between the Director of GERG (1 FTE) as well as the PhD staff. Each PhD-level GERG scientist should be formally appointed as a Research Faculty in the Department of Oceanography. In addition, some members of the Oceanography department should be encouraged to frequently use, or even reside, at GERG. Making available well-supported space for research and teaching purposes at that remote campus location would provide a clear incentive. The additional FTE should be used to compensate the PhD staff at GERG for activities involved with teaching of undergraduate/graduate students and departmental administrative functions. Many GERG staff are now engaged in some significant level of teaching activity and are effective at it, judging from review of their publication records. However, this clearly university-type involvement of personal time and intellectual property is now not compensated financially.

The appropriate space for faculty offices and labs would be either construction of a new building on their property or renovation of an existing one. An improved machine shop, equipped with more comprehensive tools and better space for fabrication should be built. This investment in infrastructure would maximize: 1) the utility and productivity of GERG's existing service mission for its contractors and 2) the ability of GERG to interconnect its research with that done by others in the College of Geosciences.

2. How should GERG be organized administratively and financially?

An Advisory Board composed of key members from GERG and the Department of Oceanography should be assembled to better tie these physically separated groups together administratively. Furthermore, as mentioned, the on-site director of GERG should have a full, academic, and not a part-time, research faculty appointment in the Department of Oceanography. All PhD-level staff at GERG should have part-time research faculty appointments within the Department of Oceanography. In order to effectively unite these groups, some faculty now within the Department of Oceanography, particularly those involved in ocean observing fieldwork and/or environmental chemical analyses, should be given office and laboratory space at GERG and be encouraged either to frequently use or reside on this remote campus. These administrative adjustments would significantly benefit the overall value of GERG and the

Department of Oceanography to the general teaching and research mission of the College of Geosciences as well as other TAMU academic units.

3. How should current and new scientists/faculty be affiliated with GERG and the University?

To significantly expand GERG's already established value as a research and teaching entity, it must be better integrated with the College of Geosciences and given more core financial support from TAMU. The level of that support and how these funds should be administratively allocated are described in our response to the first question. The director should have a full, academic faculty appointment and all PhD-level staff should have research faculty appointments in the Department of Oceanography. This commitment would help to assure that the individuals become integral members of the faculty in the Department of Oceanography and have a solid voice in the making of important administrative decisions for the department, particularly those that impact GERG's overall function. To emphasize a critical point, an incentive is needed to assure that some of the current members of the Oceanography faculty will use GERG on a frequent basis or even reside there. Improvement to research and teaching lab space at the remote GERG campus would provide one attractive incentive.

4. What strategic opportunities exist for GERG, and what is the appropriate scope of GERG given future and existing funding opportunities?

The need for environmental sampling and reliable chemical analysis of such samples will not diminish any time soon. The opportunity exists for GERG, if its analytical equipment is kept up-to-date, to continue its well-developed role as a contract lab and to establish genuine value as an educational resource for students pursuing careers in environmental assessment and management. In our discussion with the Interim Director of Environmental Programs (Andrew Millington), we learned an opportunity may exist for GERG to develop a strong educational tie with the Department of Geography. Some Geography students apparently pursue environmental research that has relevance to the interests of the Oil & Gas industry. Upon graduation, they ultimately seek employment in that industry. Currently, access to appropriate analytical facilities on the main campus of TAMU, like those setup and maintained by professional staff at GERG, is limited; hence, these students must necessarily now restrict the scope of their projects. Potentially, this issue could be eliminated, or at least significantly lessened, if an academic / research collaboration between GERG and students in the existing Environmental Programs at TAMU were established. Students involved in this interdepartmental partnership should upon graduation be even more highly sought-after candidates for employment in aspects of the Oil & Gas industry or environmental regulatory agencies involved with it.

In addition, ocean observing is moving slowly but steadily forward on the national level. The ocean's relevance to societal issues will continue to be better appreciated. At present, federal support for basic research in ocean observation is being boosted. Consequently, the capability of GERG to support and enable *at-sea* research for TAMU staff is becoming increasingly relevant. This relevance and value would be even further heightened if TAMU were to seek another research vessel and strive to sustain / re-establish a solid seagoing expertise within the Department of Oceanography.

Modest investments in state support (another FTE) and improvements to the GERG physical plant will allow this remote campus to sustain high quality analytical and ocean observing capabilities, to participate far more effectively in teaching, and to accommodate the on-site needs of staff and students in the Department of Oceanography who engage in research and training on this remote campus. Investment in a machine shop facility would have clear advantages not only to the established ability at GERG to fabricate oceanographic buoys and moorings, but also to overcome a major concern voiced by several members of the current Department of Oceanography faculty. They no longer have suitable facilities readily available on campus to serve their machining needs. Also, we learned that IODP does not have machine shop facilities of its own. On an as-needed basis, they contract outside TAMU for all of their machine shop work. Although it would be impractical to establish a machine shop facility at GERG that would handle the most major requests from IODP, an improved facility that serves the current needs of GERG for buoy and mooring fabrication (and the more occasional needs of the Department of Oceanography) would likely prove beneficial and convenient at some level to IODP and further justify this investment in physical infrastructure.

5. What is the appropriate nature and level of University financial support for GERG?

These details have been well covered in our response to the previous set of questions

Summary of Findings and Recommendations

GERG Ocean Sciences

Finding: GERG's Ocean Sciences group has an impressive capability to design, build, and deploy oceanographic buoys, moorings, data loggers, telemetry systems, and related hardware at locations from the Gulf of Mexico to diverse global sites. It does well at supporting deployed systems with real time data processing and data provision via web pages. Its modest machine shop is capable, and the skilled staff has demonstrated their ability and willingness to compete for their own projects in service to the State of Texas (e.g. TABS – Texas Automated Buoy System) or to industry (e.g. TDI-Brooks, Congo Canyon Angola Moorings) and to support research programs in the Department Of Oceanography at TAMU (e.g., Dr. Alex Orsi's work in the Western Scotia Sea and Dr. Steve DiMarco's NOAA-funded hypoxia project). As such, the GERG Ocean Sciences division is both a vital ongoing effort and the potential kernel of expertise for future field efforts by the Department of Oceanography. That expertise would come in the form of experienced personnel, capable of developing budgets for fieldwork, knowledgeable about shipping, staging, and logistics, capable of designing data loggers, integrating diverse instruments into observing systems, and experienced at quality control and processing of data and at serving data to users. The potential value of the core expertise in ocean fieldwork now extent at GERG cannot be understated; it can enable Department of Oceanography staff to consider and successfully compete for research funding of field programs; it can be an attractive asset when either seeking to hire new sea-going faculty or when competing for operation of a new research vessel.

Recommendations for the Ocean Sciences Group at GERG:

1. If the future goals of the Department of Oceanography include a strong commitment to fieldwork and/or to operation of a research vessel, it is essential that the GERG Ocean Science division be sustained, nurtured, and recognized as a core asset of the Department of Oceanography and the College of Geosciences. As mentioned, this effort should include PhD-level Ocean Sciences researchers being partially supported as Oceanography research faculty.

2. The machine shop is quite modest. A more complete machine shop, with more space, allowing fabrication and welding to be done indoors in all weather conditions is recommended.

3. The location of GERG on the present parcel of land should be preserved. The open space is invaluable to storage of ocean hardware and also to establishing a dedicated area for burning-in assembled meteorological buoys as far away as possible from shadows and wind distortion. The sale of land at the GERG parcel should not be done at the cost of losing an area for staging, storage, and pre/post-deployment testing. There is no equivalent space closer at hand to the Department of Oceanography.

4. The GERG Ocean Sciences staff should be available to the Department of Oceanography staff to support fieldwork, and likewise, the Department of Oceanography staff should be expected to budget the cost for use of GERG personnel. The GERG Advisory Board mentioned above should be empowered to oversee the GERG budget so that these costs are clearly understood by all affected faculty and staff.

GERG Environmental Chemistry

Finding: GERG's Environmental Chemistry group has a long-term, well-established record of having done highly effective contract work for a variety of clients. The State of Texas and the US Fish and Wildlife Service (US-FWS) have been their two major, consistent clients over the years. In fact, it appears that GERG-EC is one of perhaps only three major labs in the nation that serves the contract analytical needs of the US-FWS for measurement of various priority pollutants in fish tissue. In addition to success in carrying out and effectively completing contracts within the highly stipulated time frame of such work, the relatively small number of GERG-EC staff have managed consistently to provide an educational benefit to graduate students from the Department of Oceanography and Geography at TAMU. This fact is well demonstrated through review of their publication record. Notably, this educational benefit results currently without any of GERG-EC staff having formal academic faculty appointments within the College of Geosciences or even any financial compensation for their time and effort. The latter details indicate that the senior GERG-EC staff are, in addition to being very good at carrying out analytical contract work, also dedicated environmental scientists, interested in intellectual collaboration and facilitation of career development for their young, up-and-coming next generation of scientists. GERG-EC seems clearly to be an asset, albeit currently quite under-appreciated, to the Department of Oceanography and TAMU as a whole.

Recommendations for the Environmental Chemistry Group at GERG

1. The existing educational connection between GERG and the Department of Oceanography needs to be strengthened and formalized. A major first step in this direction would be to appoint all senior GERG-EC staff as research faculty within the Department of Oceanography and to provide them with some level of FTE support ($\geq$0.2 per yr) as compensation for their time and effort spent to educate students who seek careers in the environmental management and assessment field.

2. The instrumental labs at GERG-EC do not appear to be duplicated on the main TAMU campus. But yet, undergraduate students, now associated with existing environmental programs on campus, have needs for access to such laboratory capabilities in order to obtain practical skill from their education and thereby reap the benefit it would have for their future employment prospects. A dialogue between senior GERG-EC staff and those administrating these environmental programs should be established to define how this current limitation could be overcome in an optimal win-win way.

3. Given the more publically visible educational benefits resulting from GERG-EC having taken steps like those in the first two EC recommendations above, administrative discussion with contractors such as the State of Texas and US-FWS should ultimately be opened. The goal would be to establish a viable financial mechanism to not only maintain the performance of existing instrumentation but also, and most importantly, to add new instrumentation that advances GERG-EC's ability to provide them with the quality data that serves their evolving environmental management needs.

General Recommendations for GERG

1. There should be a plan to better integrate both the Ocean Sciences and Environmental Chemistry staff GERG with the Department of Oceanography. All senior (PhD level) staff in

both GERG groups should have research faculty appoints in the Department of Oceanography. Office, lab, and staging space should be developed at GERG for use by Department of Oceanography staff and students. Some Department of Oceanography staff should have offices at GERG. Drawbacks caused by the geographic separation between the two locations need to be dealt with proactively. The GERG Director should be a full Faculty member in the Department of Oceanography and engaged in the overall function of that Department. A shuttle bus, or some other means of public transit, should be considered to facilitate efficient back-and-forth flow of staff and students between the College of Geosciences and GERG.

2. A lead point of contact at GERG, preferably someone familiar with the needs and demands of both the Ocean Sciences and Environmental Chemistry groups, should be clearly identified to the staff of the Department of Oceanography. That lead should have sufficient state or overhead support so that he/she would be available to meet with Department of Oceanography staff to discuss potential projects, to take ideas that mature through the stage of proposal preparation, and to oversee the staff and material requirements for successful completion of collaborative Oceanography/GERG projects.