

Date: February 17, 2006
To: Dale Bacon, 3M
From: John Giesy, ENTRIX Inc.
Re: Follow up to February 2, 2006 meeting (revised memo)

I am writing to follow up on our recent meeting in East Lansing. During that meeting we discussed several topics. Here I will recap my understanding of the topics and questions that were discussed and the tasks that we were directed to undertake. Please let me know if any of the assigned tasks need to be changed in any way. Please contact us with clarification or additional directions.

1. We have confirmed that the standards ordered by 3M in November did arrive at MSU. In the future we will be certain to notify you of shipment arrivals in a more timely manner. Sorry for not following up. My fault entirely. I just lost track of it since we did not have a specific plan in place to move forward with studies at that time.
2. Question: Should the chronic study of the potential effects of PFOS on reproduction in quail be repeated to obtain a No Observable Adverse Effects Concentration (NOAEC)? In the previously conducted study the experimental design and the fact that some equivocal effects were observed at the least dose in the diet (10 mg/kg) precluded being able to accurately assign a NOAEC. If the study were repeated, the uncertainty in risk assessments with birds would be decreased by between 5 and 10-fold. We will send you a more detailed analysis so that you can determine if repeating this study would be useful.
3. Question: Should a chronic feeding study be done with an additional species, such as the kestrel? Based on the information available in the literature, the threshold for effects seems to be similar in a number of species. However, since the quail and mallard are not top carnivores, but eat seeds, vegetation and invertebrates, an among-species uncertainty factor is used in risk assessments. If data were available for an additional species, such as a top predator, an argument could be made to reduce or eliminate the among-species uncertainty factor. This would result in about a 2-fold increase in the TRV, which would result in all current tissue concentrations in birds falling below the TRV and resulting in hazard quotients of less than 1.0. Thus, such a study would have value. The issue is whether the value would be sufficient to offset the cost. Such a study can be constructed. We have the contacts to set up and conduct such a study. In conjunction with this study, it would be quite simple to conduct egg injection studies with 5 or 6 bird species from which we could derive a species-sensitivity distribution, which could be used to obviate the need for among-species sensitivity factors all together for birds. If you wish to proceed with such a study please let me know and we can develop a cost for conducting the test and writing up the report.
4. Question: Should a toxicity test be conducted with *Chironomus tentans*? ENTRIX feels that this should be done, sooner than later. The one study that is published in the literature reports a very low threshold value, that drives the values calculated for water quality criteria. Because the value is much lower than that observed for other species, it is likely that if the test is repeated under GLP, that the values will be greater. This will have a great benefit in reducing uncertainty in ecological risk assessments for aquatic invertebrates. If such a test

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- is conducted, it must include the same endpoints measured in the previous study and also measure standard ecologically-relevant endpoints, such as survival, growth and reproduction (fertility and fecundity). In addition, it would be useful to measure PFOS concentration in both the overlying water as well as in the sediment. The Aquatic Toxicology Laboratory at Michigan State University has experience in running such tests and in fact developed the prototypical test on which the current EPA and OECD methods are based. ENTRIX can arrange to have these studies conducted either at a university or a contract laboratory and oversee the studies and interpret the results and prepare a peer-reviewed literature publication based on the results. Please inform us if and how you want to proceed.
5. Question: Can ENTRIX prepare a white paper on ecological risk assessments of PFCs, including PFOS and PFOA? The answer is yes. We have already collected all of the pertinent literature, so that part of the task is already ongoing, which will facilitate preparing the white paper. We will prepare an outline and cost estimate for preparing such a white paper and send it to you for you to make a decision.
 6. Question: Can ENTRIX write a paper on the impact of the 2000 phase out with comparisons to other chemicals such as DDT that had production stopped? The answer is yes. Please inform us if you would like us to prepare an outline and cost estimate for such a paper.
 7. Question: Can ENTRIX monitor R&D and environmental issues and initiative involving PFCs in the Asia-Pacific region? Yes, we can and we will begin this task immediately. We propose to give oral reports as issues arrive or information becomes available and prepare quarterly written reports as well as making all pertinent documents available to 3M. This will be done in a discrete and unobtrusive manner. Toward this end, we will continue to establish working relationships with the key laboratories and agencies in Asia. In this way, we can assure that the science that is done will be of the highest quality.
 8. Question: Should ISO develop standardized methods for the instrumental analyses of PFCs? The answer is yes and such an initiative is already underway. Dr. N. Yamashita of AIST in Japan has taken the lead on this initiative. I have already provided information on the first meeting to begin this process. If 3M desires, I can assure that they will be invited to participate in this initiative.
 9. We will continue to track literature on perfluorinated compounds. We will provide a monthly letter report that indicates the status and trends of publication rates. We will continue to maintain the Reference Manager literature data base.
 10. We have completed the data base on concentrations of PFCs in the environment. We will not continue to develop the referential retrieval data base. If in the future there is a specific need for this data file, we can update it at that time.
 11. We will prepare revised study plans and budgets for two separate tasks. The first task is to collect mussels from the NOAA mussel watch program and analyze them for a range of PFCs and maintain an on-going study of the status and trends of these compounds in the near-shore marine environment of North America. The second task is to look at methods to assess the nature and characteristics of the total PFC load in the environment. This will be a joint project that will involve the University of Saskatchewan and can be used as a mechanism to involve key laboratories and institutions in Asia to maintain a working relationship that allows access to information and to influence the quality of studies in Asia.
 12. Question: Can $C^{12}:C^{13}$ ratios be used to identify sources of PFCs in the environment? It is possible to determine the source of anthropogenic chemicals in the environment using the $C^{12}:C^{13}$ ratios when the manufacturers obtain carbon source materials from different global locations. ENTRIX can arrange to have a study conducted to determine if this would be a viable method for determining sources of PFCs in the environment. Please inform us if and how you want to proceed.