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May 5, 1980

Mr. Donald E. Solberg
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Dear Don:

It seems I am once again long overdue for a progress report, so I will try to be as complete as possible. During the past several months our activity on this program has been at a considerably reduced level due to the requirements of other commitments. As a result expenditures have been relatively minimal leaving us with a rather healthy funding level to make a very concentrated effort during the remainder of the year. We have, nonetheless, completed a number of important goals and crystallized our plans for some others. I have been attempting to put together a suite of well-characterized samples which constitute effectively a generic study of the long-lived activation products problem. In addition to the concrete and rebar samples we reported in November, we have also essentially completed analysis on six stainless steel and a vessel steel sample. I say essentially since there are a few remaining things to do. The samples have been sent to LECO for nitrogen analysis and we are awaiting results.

We also plan to try out the prompt gamma system at NBS to determine if this will provide additional useful information. That work has been delayed due to shutdown of the NBS reactor and will be carried out in the next few weeks. We are currently starting a big push to get hold of as many samples as possible from the contacts we have already made. We have been promised samples from a number of sources including GE, Westinghouse, EPRI and Duke Power, but have not yet been successful in getting samples in hand. This simply needs some intensive telephoning, perhaps followed by site visits if necessary.

Over the last few months I have put much effort into clearing up some remaining problems with my computer calculations. I finally abandoned attempts to use the ORIGEN code since it seemed to be extremely inconvenient to use with the computer services available here. I have completed instead development of my own code for our PDP 11/35. It is essentially tailor made to this particular problem. I have checked it against ORIGEN where comparable data was available and obtained equivalent results within about 2%. The fast neutron portion is now working to my satisfaction. I am using full 1-15 MeV neutron excitation functions generated by code THRESH obtained from the National Nuclear Data Center at Brookhaven. The program is a semi-emperical fit to nu-

clides with $Z \geq 21$. There are only a few isotopes of interest below that and I have some cross-section information on those from some past cosmic ray work I have been involved in. I don't expect fast neutron reactions to be of major importance, but I would like to be able to produce a complete quantitative inventory to answer the question once and for all. Future work on calculations should simply concentrate on calculating results as needed plus making some minor modifications to cross-section libraries as new data becomes available.

Our radiochemical work to date has concentrated on testing and verifying radiochemical assay procedures for a number of the isotopes of interest. This has been developed in parallel with Dave Robertson's program. Rather than attempt complicated multielement chemical schemes we settled instead on a simpler, more reliable procedure for carrying out single element purifications on aliquots. In many cases this will result in purification of more than one isotope; ^{152}Eu, ^{154}Eu, ^{155}Eu for example. We have tested counting and chemistry procedures for the following: ^{41}Ca, ^{54}Mn, ^{55}Fe, ^{60}Co, $^{59,63}Ni$, ^{90}Sr, ^{93}Mo, ^{94}Nb, ^{108m}Ag, ^{137}Cs, ^{151}Sm, $^{152,154,155}Eu$, ^{166m}Ho, ^{239}Pu. We have yet to decide on a method for ^{3}T and ^{14}C. We will look into that further after we have some results. For our first hot sample we plan to use an SS304 reactor internals sample from the Point Beach reactor. This sample received a very heavy neutron dose and should be ideal for our purposes. I'm particularly interested in looking at the ^{94}Nb in this sample to verify the level of that problem. This sample proved to be more trouble to obtain than I believed initially since it was onsite. Unfortunately, the hot cell containing the sample developed a problem with its airlock. That was supposed to have been repaired in October-November, but was only recently finally repaired. We now have the sample in a cask and are ready to start work on it. In the meantime, I obtained permission to use a shielded glove box in a nearby building for sample handling. This even came equipped with a lapidary saw for cutting concrete samples so is ideal for our purposes. At present our best radiochemist is out of the country on a DOD project. We plan to start work on the Point Beach samples as soon as he returns in two weeks.

Obtaining activated concrete remains a problem. We are counting rather heavily on obtaining useful bioshield samples at Pathfinder and Indian Point #1. We have obtained coring equipment capable of producing a twelve foot long core. This equipment was tested briefly on a concrete slab in back of our building. We are planning a full dress rehearsal for the Pathfinder work at one of the Hanford K production reactors. This is currently scheduled for May 19-21. One of our prime goals will be to work out any remaining problems with the coring equipment. It may also be possible to obtain a useful sample at that time. The Pathfinder trip itself is scheduled for the second week in June and that appears to be proceeding satisfactorily. We will probably sample Indian Point in the fall taking advantage of lessons learned at Pathfinder. The coring situation at Indian Point is at present unclear. We have been given permission to do the coring, but were unable on our brief tour through the plant to find a suitable sample site. The most accessible areas we found were in what appeared to be unacceptably high radiation fields. We will have to work that out when we get there.

On the whole, all aspects of the program except acquisition of unirradiated samples appear to be going satisfactory. That will receive a major increase in effort. Please let me know if you have any further questions.

Yours truly,

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