1.

P. BLOCKEY-O'BRIEN
D23 Golden Valley, Douglasville, GA 30134 USA

The Executive Director,
US Nuclear Regulatory Commission,
Washington D.C. 20555-0001

Feb. 21ST 1995

Re: My Petition for Director,s Decision under 10 CFR 2.206 to the US NRC ,
Docket 50-160. Neely Nuclear Research Reactor, Atlanta etc. etc.
~~50~~-160

Dear Director,

I hope you are well. You will be glad to see that I have a typewriter to use that has legible type. I also no longer have to keep tying the ribbon together, as I go, each time it breaks, so that's rather a change !!

I would like you to enter the enclosed article on the Reactor from the newspaper "Creative Loafing" , Dec. 17th 1994 into the record of my 2.206 petition, and into the Federal Register, so everyone can read it. It was their cover story, "Ramblin' Reactor" and inside "Checking out the hottest spot on campus." I thought you'd find the allegations of human feces in lunchbags at the reactor, and of substituting contaminated waste water for tap water rather interesting, to name but two items raised in it.

I also want you to add to my 2.206 a few other things that are serious that have come up and need to be in there as they are of great concern.

1. When the judges were down here recently for the GANE hearing on the liscence, during the public comment period, someone raised about how they want to do medical research on brain tumors there at the reactor - sort of sad, as radiation can cause brain tumors. Anyway, I meant to tell the judges, that I had been told, by a former radiological safety officer, that there may be a problem calibrating the column which should be looked at, as it may kill the patient , and because of this problem potential , it would need to be fixed, which would cost a great deal of money - but better that, than killing someone. I got so upset about the whole situation, I forgot to tell the judges, so could you please tell them that, or enter it into that record, or whatever it is you do up there to get it done legally.

2. According to EPD documents, here a few figures on sewer dumping which are important in view of what will follow these figures:

11/5/79 2,800,000 pci/1 tritium (140 times drinking water allowed levels of 20,000)
2/26/90 341,000 " " (over 17 times over allowed levels)
5/22/91 102,000 " " (way over again)
7/26/93 122,000 " " (" " """""""")

11/5/79 Strontium 90 15 pci/1 (drinking water allowed levels are 8 pci/1)
12/18/80 Strontium 90 125 "
9/11/80 Strontium 90 94 "
2/16/81 Strontium 90 56 "

12/18/80 Cesium 137 1450 pci/1 BETA 1950 pci/1
5/22/91 520 pci/1 Cobalt-60

These are a few examples. Now tritium has a half-life of a bit over 12 years, so in approx. 120 years the length of its full radioactive hazardous life, it will be gone. The half-lives of the strontium and cesium are far higher as you know. So that remains radioactive approx. 300 years. As you may know, EPA has the most pathetic drinking water standards for radioactive contamination, but the few they have clearly show that the above are in violation. EPA says the BETA should not go over 4mrem year/50 pci/1. Strontium and Cesium above are beta emitters. The cobalt-6o is rather bizarre in that it also gives off beta as well as gamma. What all the tritium

4E03

cesium-137, strontium-90, cobalt-60 and other radioactive crud does to internal organs is well documented and pretty grim, drinking contaminated water is sort of like commiting slow suicide (not that NRC seems to care , as under its Below Regulatory Concern stunt , NRC wanted to allow even more dumping of radioactive crud, but just to sy it was"below regulatory concern"- also known as pretending to be fairies who can wave a magic wand and make things dissappear, an act industry longs for.). Now NRC allows all sorts of staggering levels to be dumped to sewers, EPA puts a few measly regulations on drinking water and the Clean Water Act seems to get into the act with its NPDES discharge permits, which are a liscense for industry to chuck all sorts of things into the waters , but they too have a few levels. Of course industry is MEANT to abide by the levels, but you know how that is.... if they were all abiding by the laws that exist we'd have half the problem we do. Then comes something called CITY Ordinances, and lo and behold , guess who doesn't have a permit to dump to the sewers ? And guess who would not get it any way as they would not be allowed to dump radioactive crud above the lousy standards for drinking water to the sewers anyway ? The Tech Reactor.

So it is beginning to look like they've violated City Ordinances since a very, very long tim time. Furthermore, as the sewer lines must be/are contaminated, and as the contaminated water goes to the R.M. Clayton sewer plant, where the sludge is incinerated so the radioactivity went out the stack too and blew over the neighborhood, and other (radioactivly contaminated) incinerator products are being turned into bricks, or land applied,this could be a major reason why it has just been established that the **cancer rate for the district where the R.M. Clayton treatment plant is in has the highest cancer rate of Fulton County - i.e. the highest cancer mortality rate. District 5 has a 29% greater cancer rate than the resto Fultonounty and the mortality rate for stomach, pancreas and prostate cancer in district 5 of Fulton County is double the rate of the rest of the county (including t he inner city of Atlanta). The lung cancer rate was 54.8 for District 5 With 76 deaths, in the rest of Fulton County it was a rate of 45.4 and 232 deaths based on a four year average 1990-1993 and the populations.** Although the other toxic emissions in the area and the area Cerclis sites will also play a role, the radioactive contamination will also play a role. I want the NRC , as part of this 2.206, to test the lines from the reactor all the way to the RM Clayton plant, I want sludge there and any areas it has been applied to land tested. I want the inside of the incinerator stack and the filters and fly-ash tested, I want the workers tested (including past workers for as lon long as Tech's reactor has been dumping to the sewers) testedI want bricks tested (including some from the past that may have been sent out) and if the ash is being provided to cement companies, I want the cement tested. **I want the NRC to do it, not outside contractors or the Georgia EPD, and I do not want the tests run at the Tech Rector in case some bright spark comes up with that idea. Tech and people who used the reactor in the past such as othe universities and the Departmet of Energy and companies like Westinghouse can pay for the tests, not the taxpayer. Since DOE is taxpayer funded, you could tell the DOE heads to pay out of their huge salaries.** And the same people can pay for the cleanup of the mess.

As to the probable violation of City Ordinances,according to what I have been told by those responsible for enforcement, wouldn't breaking that law be a reason to take away their liscence and shut the Tech reactor down ? And isn't there a lesson i n all this about why NRC should **not** allow any sewer dumping of contaminants ? What NRC doesn't seem to understand is this : after the water goes through treatment plants from which radioactive contaminants (and some non-radioactive ones) can't be removed, the ter is then discharged to the river (in this case the Chattahoochee) and then a bit dow stream it is hauled out as "clean" water (i.e. the law thinks it's clean) and after throwing a bit of chlorine at it to kill bacteria, it's drunk. Common sense dictates there should be no sewer dumping. NRC in Atlanta told me the other week that sewer dumping of Cobalt-60 is still allowed if it is soluble . This is beyond stupid. It is still radioactive. It still bio-accumulates as do all other radioactive contaminants.

3. With regard to the site geology: even if the reactor were on solid rock which it is not, over hundreds of miles of granite, the internal strength of rock is immaterial once fractured, water seeps in. In case of earthquakes, however small, this can be a major problem. Due to the water backup from the sewers and from area flooding, plus the fact that it is on the Wahoo Creek formation, water intrusion all over the place is highly likely. During geological studies in the metro Atlanta area, it was also established that a number of so called "bottom hole fracture" wells existed. In geological terms, three of them were located in the fairly close proximity to the reactor in Fulton County. Bottom hole fracture wells yield very high quantities of water. It is believed they derive them from horizontal stress relief fractures. Horizontal stress relief fractures were also quote" important in units consisting of gneiss interlayered with schist and in schist and amphibolite" (Wahoo Creek formation has all three) See: Groundwater in the Greater Atlanta Region by Cressler, Thurmond and Hester, Ga . Geologic Survey, Bulletin InformationCircular No.63. High water yields in this type of geology could perhaps also be an additional reason for area flooding in Atlanta after heavy rains, due not only to runoff and swollen streams, but in groundwater levels rising quite rapidly, all that would of course affect stability . The Atlanta metro area has a highly complex geology, unlike many other areas of the nation. This is why site-specific detailed information is needed, taking into acount the geology of the ajoining formations - i.e. Stonewall and Clairmont formations - the Brevard fault along the Chattahoochee and the area water/groundwater problems. Its also why the tacky bit of information provided in the Tech /Neely Reactor's reliscensing application is totally inadequate.

4. A thirty-year Wind Rose is needed, not the silly five year Wind Rose they used in the reliscensing application. There's a big difference. In particular trying to establish possible accident release scenarios, such as a steam explosion.

5. There do not appear to have been any tests run for plutonium contamination orU 239 contamination. Why not ? It's needed for soil, water, stack emmissions, sewer lines.

6. Tech says that effluents released are assumed not to contain I-129 and radium. Never assume. In that case why are the Ra 226 and RA 228 levels in soil between 700 pci/kg and 2600 pci/kg, with mostover 1,200 pci/kg ? Did fairies put it there ? The Luminous Processes site near Athens had soil samples of RA 226 in the 1,300 to 2,600 pci/kg range and was considered a flaming disaster and had to be cleaned up. What about Techs reactor contamination ? And what about the high levels of BE-7 showing up ? E.G. vegetation BE-7 1o,300 pci/kg on 3/i9/84, 10,300 pci/kg on 6/20/85 ,7,000 pci/kg on 4/22/91 . Since when do leaves/grass/vegetation contain large amounts/ANY amounts of radioactive beryllium 7 ? BE-7 in vegetation on 3/i9/84 was 15,000 pci/kg and on 3/3/92 was 11,100 pci/kg. Could we perhaps have a little problem here irradiating gemstones ? I mean, according to a respected geologist here, it's highly unlikely one is going to find beryllium around here, in that area, let alone radioactive beryllium 7. Atlanta is not known as the emerald capital of the world.,or aquamarine capital of the world ? And didn't we have a little gemstone irradiation problem in the past at Neely, to put it mildly ? Or is it coming from the reactor itself since it's used in their construction ? Have we a little "activation product" problem ? What's going on here ?

7. When the judges were down in Atlanta recently to hear the Georgians against Nuclear Energy petition for Techs Neely Reactor liscence withdrawal, someone testified that their company wanted to use the reactor for medical research on brain tumors. According to a former safety officer, there MAY be some sort of problem calibrating the column and if so, they could accidently kill the patient. Furthermore, that it would cost a lot of money to fix. So you all better look into that, ~~too~~. NOT JUST TECH THE JUDGES.

8. In case of accident : Ga. EPD Radiation Surveillance Program told me they have no doctor on staff, and would have to locate one as they didn't know who they would call in. It was in regard to a doctor specializing in victims of exposure to radiation.

3. With regard to the site geology: even if the reactor were on solid rock which it is not, over hundreds of miles of granite, the internal strength of rock is immaterial once fractured, water seeps in. In case of earthquakes, however small, this can be a major problem . Due to the water backup from the sewers and from area flooding, plus the fact that it is on the Wahoo Creek formation, water intrusion all over the place is highly likely. During geological studies in the metro Atlanta area, it was also established that a number of so called "bottom hole fracture" wells existed. In geological terms, three of them were located in the fairly close proximity to the reactor in Fulton County. Bottom hole fracture wells yield very high quantities of water. It is believed they derive them from very horizontal stress relief fractures. Horizontal stress relief fractures were also quote" important in units consisting of gneiss interlayered with schist and in schist and amphibolite" (Wahoo Creek formation has all three) See: Groundwater in the Greater Atlanta Region by Cressler, Thurmond and Hester, Ga . Geologic Survey,Bulletin InformationCircular No.63. High water yields in this type of geology could perhaps also be an additional reason for area flooding in Atlanta after heavy rains due not only to runoff and swollen streams, but in groundwater levels rising quite rapidly, all that would of course affect stability . The Atlanta metro area has a highly complex geology, unlike many other areas of the nation.This is why site-specific detailed information is needed, taking into account the geology of the ajoining formations - i.e. Stonewall and Clairmont formations - the Brevard fault along the Chattahoochee and the area water/groundwater problems. Its also why the tacky bit of information provided in the Tech /Neely Reactor's relicensing application is totally inadequate.

4. A thirty-year Wind Rose is needed, not the silly five year Wind Rose they used in the relicensing application. There's a big difference. In particular trying to establish possible accident release scenarios, such as a steam explosion.

5. There do not appear to have been any tests run for plutonium contamination or U 239 contamination. Why not ? It's needed for soil, water, stack emmissions, sewer lines.

6. Tech says that effluents released are assumed not to contain I-131 and radium. Never assume. In that case why are the Ra 226 and RA 228 levels in soil between 700 pci/kg and 2600 pci/kg, with mostover 1,200 pci/kg ? Did fairies put it there ? The Luminous Processes site near Athens had soil samples of RA 226 in the 1,300 to 2,600 pci/kg range and was considered a flaming disaster and had to be cleaned up. What about Techs reactor contamination ? And what about the high levels of BE-7 showing up ? E.G. vegetation BE-7 1o,300 pci/kg ,on 3/19/84, 10,300 pci/kg on 6/20/85 ,7,000 pci/kg on 4/22/91 . Since when do leaves/grass/vegetation contain large amounts/ANY amounts of radioactive beryllium 7 ? BE-7 in vegetation on 3/19/84 was 15,000 pci/kg and on 3/3/92 was 11,100 pci/kg. Could we perhaps have a little problem here irradiating gemstones ? I mean, according to a respected geologist here, it's highly unlikely one is going to find beryllium around here,in that area, let alone radioactive beryllium 7. Atlanta is not known as the emerald capital of the world.,or aquamarine capital of the world ? And didn't we have a little gemstone irradiation problem in the past at Neely, to put it mildly ? Or is it coming from the reactor itself since it's used in their construction ? Have we a little "activation product" problem ? What's going on here ?

7. When the judges were down in Atlanta recently to hear the Georgians against Nuclear Energy petition for Techs Neely Reactor liscence withdrawal, someone testified that their company wanted to use the reactor for medical research on brain tumors. According to a former safety officer, there MAY be some sort of problem calibrating the column and if so, they could accidently kill the patient. Furthermore, that it would cost a lot of money to fix. So you all better look into that.

8. In case of accident : Ga. EPD Radiation Surveillance Program told me they have no doctor on staff, and would have to locate one as they didn't know who they would call in. It was in regard to a doctor specializing in victims of exposure to radiation.

9. The Division of Public Health, Environmental Health, of the State of Georgia, does not have a doctor specializing in effects of radiation /radiological health/ medical effects of radiation. In case of emergency this would be grim.
1o. In Tech's documents, the emergency cooling would only work for around thirty minutes, then they'd have to try and hook up city water, as I stated before which may not work. If that doesn't work, they say they would use irradiated fuel storage water, but that would unshield the thousands of curies of cobalt-6o.....ooops.....
11. A general emergency is not addressed (p 14)
12. With regard to nuclear waste : by 1980 more than 5,600 federal studies on what to do with waste had been studied... as yet there is no solution anywhere in the world as to how to render the waste harmless, or isolate it properly for up to millions of years. This reactor adds to the waste problem.
13. A former student who was at the reactor, now with EPA told me he knew they used to release Argon-14 daily at twice background levels. In addressing the question of air monitoring, where are all tests for Sr-90 and Cesium-137 and I-131 H-3 etc. To say "exhaust MAY contain....etc" p. 93 and 97 is not good enough. Where are internal and external (to the stack) measurements ??. There are fraternity houses almost next door, and people all over the place. Doses for men,women,the elderly, infants and pregnant women and children should have been/be calculated for people within a 50 mile radius in 1/8th of a mile increments. That is common sense.
14. With regard to sewer dumping : NRC's basing it on "Reference Man's" intake of water annually is ridiculous. NRC states that "Reference Man means a hypothetical aggregation of human physical and physiological characteristics arrived at by international consensus. These characteristics may be used by researchers and public health workers to standardize results of experiments and to relate biological insult to a common base." NRC has one word right : insult. Such garbage is an insult to the people, the individuals who inhabit the earth. Each being totally different from the other in some way.
It does not take into consideration age,sex, general health, etc. Is NRC's "Reference Man" the same non-existant twit other agencies thought up, the 6o kg fellow who drank X liters of water a day? (and may or may not have been based on Tarzan or one of Hitlers Master Race ?) Such stuff is nonsense. Furthermore, NRC Atlanta tells me its OK to dump now if its in soluble form (e.g. cobalt-60) as I stated earlier - I have a good suggestion, make that "Reference Man" Soluble. Banish such foolishness and do your work based on health effects to real people, taking the most vulnerable and frail as the baseline, infants, children, pregnant women and the fetus, etc. the world is not made up of a bunch of Supermen.
15. In Tech's Neely documents, they took the worst accident scenario,considered it incredible, and wouldn't analyze it. It is in connection with HEU and LEU Cores, p. 141. This sort of attitude is Incredible. This whole section on possible fuel changes ie. from one type of deadly nuclear fuel to another, consisted of Argonne National Labs reviewing reports and doing comparisons with similar reactors. In other words, lots of paperwork passed back and forth, and computer modelling and little models were made and everyone had lots of fun, and words like "we expect" were used, but they didn't have the data from the analyses of the HEU core, so they just tossed in a few uncertainty factors and invented the coolant flow and a few other things . The appendix talks about engineering uncertainty factors on three serious safety issues, and instead of using plain English, they call them "hot channel factors" - is this because if in REAL life something went wrong a lot of people would make sure ANL and Georgia Tech got put on a worldwide "hot channel" on International television to try and explain away their incredible attitude.
16. The whole section on the nuclear safeguards committee responsible for maintaining HEALTH and safety standards does not contain anything at all on health. They don't even seem to have a doctor on staff who specializes in the health effects of exposure to

radiation. Faculty and students can be exposed to levels greater than 500mrem and they'll provide a summary to Tech. They can summarize all radioactive releases. This is disgraceful. Because of this attitude, all staff and students should be checked for interr - as well as external exposure.
17. They seem to be storing high level waste on site. This is very dangerous.
18. All water reactors possess the ability to function as boilers. Under "pump failures" page 178, they say some boiling may initially take place in the fuel coolant channels, and that the ability of water to flow into the element against escaping steam vapour cannot be estimated well. This could be a very serious situation. To then say that "...it is reasonable to expect...".is not good enough.
19. Under "loss of coolant" p. 181, they admit that in the event of loss of coolant where they couldn't jerry rig the famous hose etc. that it is likely that some fuel melting will occurr. They then figure out dose rates , not only with lousy old data, but in a manner that would probably have little to do with real life. However, what is really awful, is that they have the unmitigated gall to describe a major accident as a "NUCLEAR EXCURSION", making it sound like all these cute little radioactive isotopes are going to Panama City by Greyhound for the weekend, when what is at stake is the possible death of a city.
One of the worst sentences is, that after a "nuclear excursion" those isotopes which were retained in the body would irradiate the tissue for an extended time..
That is what this is all about. That "body" could be a three year old, and that "tissue" could be in its little brain. It is not worth keeping that dump of a reactor going to risk that.
20. On p. 21 they boast about showing the Boy Scouts of America the place. No child should be allowed near, let alone IN such a dangerous place.
21. When they stated near the beginning there had been no safety problems , that is a lie as NRC well knows. They say nuclear energy produces thermal energy without the release of carbon dioxide - well how about the releases of radioactive crud ? And how about the fact that acid rain (as I have stated in other testimony to the federal government) is also caused by nuclear materials from tests etc. To say that the major environmental effect caused by the Three Mile Island nuclear accident is not the radioactivity released from the reactor but the sulfur emissions from fossil fuel power plants which were built to replace the lost energy available from the reactor, as they state, is a terrible lie considering that, for example, comparing the period three months prior to the accident against the period four months after the accident, Pennsylvanias infant mortality rate increased 16% and Maryland's increased 41%, and one study shows that perhaps as many as 50,000 deaths occurred during 1980-1982 as a result of the TMI accident. Besides, the Neely reactor does not generate electricity. Atlanta won't go dark without it, but with it, in case of accident or terrorism, it would go dark for a very long time.
22. They state there is no comparable facility. Thank God for that. One lousy, old reactor in an area that floods, on unstable soil, in the middle of a university campus, in a major city, in an earthquake zone, is more than enough.
23. It makes little difference if all the sewers in Atlanta are repaired prior to the Olympics, which will not be the case anyway, because the problems relate to the volumes of water going through them, their size and age. It is the equivalent of cramming twenty generations of a large family into a Model-T Ford,most would cling to the outside, and many would have fallen off. A few days ago the raw sewage and breaks was photographed by the Atlanta Business Chronicle, they just did a big article on it. A city official who deals with some of the current problems agrees that the extra stress on the Orme St. Trunk from all the Olympic Housing around the reactor could bode ill. You would be amazed to know how many people intend to try and leave Atlanta during the Olympics due to fears over infrastructure problems.

24. I spoke to a Captain with the Georgia Tech Campus Police. As they are among the first to act in case of an accident according to Techs documents and would have to block off the area, I thought it would be rather nice if someone enquired whether or not they had any kind of protective gear. a) they don't. b) He said he was being told an accident wouldn't be such a problem - after I told him there could be airborne contaminants, or a steam explosion with a large radius affected. I find this terrible. These policemen are meant to perhaps put their lives on the line, and in a major accident would recieve serious contamination or could die, and they haven't got a snowballs chance in hell without protective gear. They obviously are being told less than the truth about what could happen in case of a accident. Goodness knows what they are supposed to do in case of some ghastly terrorist attack - I was afraid to ask- probably something stupid like evacuating the campus to the DairyQueen in Jasper County. That is what a particular Atlanta zip-code is meant to do in the case of a nuclear war and a direct hit on downtown Atlanta; cross Atlanta and head for the Dairy Queen .....your government at work. Don't laugh, Washington probably has some equally idiotic plans.

25. I have been told gemstone dealers have been renting space at the reactor to have their gemstones irradiated to turn them better colors, and that some "burned up". This is outrageous. To expose the public to radioactive jewelry out of greed is a disgrace. If this has happened, who got paid for it ? Where are those radioactive stones ? Is that one of the reasons the BE-7 is showing up in vegetation ?

26. I would like this all put in the federal register too, along with the rest of my petition.

I hope NRC will hurry up and act and grant my petition, there is simply too much at stake not to. The Cesium -137 under the floor of a nearby building, must not be forgotten. The fact that the cesium-137 and all that cobalt-60 was brought in to begin with (over objections of former safety people I might add) shows an extremely irresponsible attitude on behalf of Tech, as well as the NRC. Allowing nuclear reactors on university campuses should not be allowed, period.

My 2.206 should be granted well in advance of the Olympics as all the decontamination will take time, so NRC better get a move on. I mean, all the contaminated lines, soil, vegetation are also going to need to be cleaned up too. All the workers at the reactor should also be tested for contamination (internal as well) considering what has gone on there. Also the students and staff from the university who went in there, and the students who live in the nearby fraternity houses etc. NRC personnel who go in that dump should be checked likewise. Even Dr. Karam should be checked just in case he too is contaminated and doesn't know it, regardless of whether or not he thinks its safe. After all, he is not a medical professional. Tests should NOT be conducted by any person who is in any way associated with Tech or any facility (e.g. Emory Univ.) who may have used the reactor or support facilities. ATSDR could help with this aspect perhaps.

On Georgia EPD documents on tests done concerning the reactor, they put that BE-7 was of natural origion.....furthermore, I have been informed that the same Mr.Hill of EPD who is allowed to liscense the cobalt-60 and the cesium-137 was also somehow involved in the situation in Decatur, near Atlanta, where there was a multi-million dollar cleanup NRC is well aware of. How the NRC allows Georgia EPD to liscense that deadly stuff is beyond me - unless it is because of it being from a Department of Energy site -Savannah River Nuclear Facility. In which case NRC can tell the Department of Energy (which should be renamed the Department of War, as they make sure we get all those nuclear weapons no one wants,except the military-industry whose greed knows no end) to take it back.

If anything else comes up, I'll let you know. Frankly, I think what I have told you already is enough to cause my petition to be granted on all counts.

Sincerely,

Pamela Blockey-O'Brien

Pamela Blockey-O'Brien.

FOR RECORD: DOCKET 50-160

2.206 PETITION TO NRC FROM 1: PAMELA BLOCKEY-O'BRIEN ON THE NEELY NUCLEAR RESEARCH REACTOR ON THE CAMPUS OF THE GEORGIA INSTITUTE OF TECHNOLOGY, ATLANTA, GEORGIA.

DECEMBER 17, 1994 ■ CREATIVE LOAFING

Checking Out the HOTTEST SPOT ON CAMPUS

The thousands of athletes and support staff pouring into Atlanta for the 1996 Olympic Games will undoubtedly be impressed by the sights that greet them: the glittering new stadium, freshly minted venues and sprawling, carefully planned Olympic Village promise to offer an extraordinary display of municipal pride. As our visitors look out the windows of their comfortable quarters on the edge of the Georgia Tech campus, at the tree-lined streets and the classical spire of the Administration Building with its red-neon "TECH" facing every direction, it is unlikely they'll even notice the rounded, windowless structure and adjoining building resting within a fenced compound.

STRANGE COINCIDENCE?

The Environmental Protection Division of the Georgia Department of Natural Resources maintains a radiation monitoring program around the Neely Reactor. Fourteen thermoluminescent dosimeters (TLDs) surround the site; after allowances for background radiation are removed from the figures, the readings over the last 10 years show that TLDs No. 1-4 (shaded area on map) have consistently averaged 30-40 millirems per year more than the others. (Data from No. 9 is not included, because it is so close to the reactor and a storage bay that those readings are always astronomically high.) The pattern is consistent with Atlanta's prevailing wind patterns, if the radioactivity were indeed coming from the reactor.

A rem is a measure of absorbed dose equivalent: the vol-

OVER PAGE!

Tech's Bid to Re-License 30-Year-Old Nuclear Facility Draws a Mixed Reaction

By Greg Land and Warren Whipple

But behind that unimposing exterior sits an aging reactor and a stockpile of radioactive material that are giving some people nightmares; their fears — of accidents, sabotage, and the continuing release of radioactive elements into Atlanta's battered, 1890s-era sewer system — are gaining new urgency as the Neely Nuclear Research Center awaits permission from the Nuclear Regulatory Commission (NRC) to continue operations for another 20 years.

Tech's license renewal request claims the reactor has had "no safety problems" — this despite a decidedly spotty safety record, including a single inspection as recent as last year that yielded three NRC violations and an NRC-mandated shutdown following a 1987 reactor accident.

The renewal request, which is being challenged by a local environmental group, is highly likely to be granted. The NRC has never turned one down before.

• • •

When the Georgia Tech Research Reactor (GTRR) was commissioned in June of 1964, the power industry and federal government, starry-eyed with visions of "power too cheap to meter," were busily promoting nuclear energy as the wave of the future. Reactors such as GTRR were useful in industrial and military research, and Tech counted itself fortunate to have such a prestigious facility sited on its campus.

By 1973, the 1-megawatt reactor was deemed too small for the ambitious projects Tech officials envisioned, and they successfully petitioned the Atomic Energy Commission — the predecessor to today's NRC — to upgrade it to 5-megawatts.

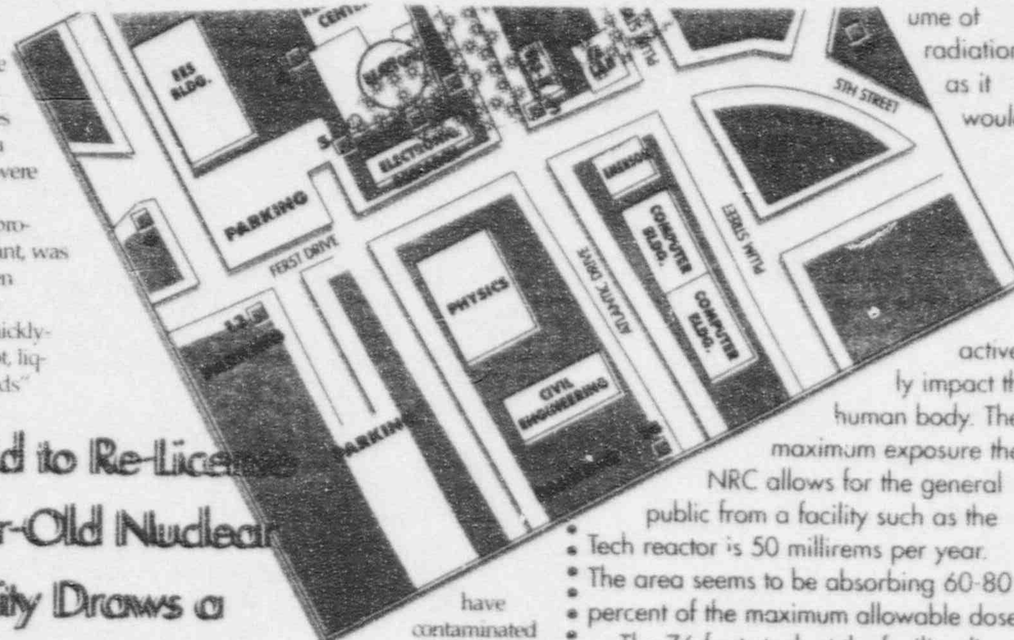
Then-Mayor Sam Massell protested to the Commission that the site was unsuitable, expressing concern over geological studies indicating that the Atlanta region was in a potential earthquake zone. His concerns were ignored.

In 1972, a huge quantity of cobalt-60, produced by the Savannah River Nuclear Plant, was imported to the site. The material had been sealed in aluminum jackets, but had to be removed and re-clad in the "hot cell," a thickly-shielded chamber equipped with four-foot, liquid-filled windows, and mechanical "hands" with which radioactive materials may be manipulated from outside the cell. During the process of cutting off the old jackets and re-casing the cobalt, one of the wafers was accidentally cut into. The resultant contamination is — as far as is known — the most narrowly averted disaster to have occurred at the facility.

"We actually encapsulated over two and a half million curies of cobalt for Westinghouse and NASA," recalls a former staff member who, like many interviewed for this story, requested that his name not be used. "We just contaminated the living heck out of the place.... It took some some quick work; our team saved Atlanta. It certainly could have contaminated that whole campus, and for a very long time." (The maximum allowable exposure to cobalt-60 for a radiation worker is six-millionths of one curie per year.)

Some 800 55-gallon drums of waste were removed following that accident, and an unknown quantity of cobalt-60 escaped into the sewer system. Over 10 years after the hot cell accident, another mishap allowed an estimated 2,700 gallons of water, contaminated

COVER continued page 25



ume of radiation as it would actively impact the human body. The maximum exposure the NRC allows for the general public from a facility such as the Tech reactor is 50 millirems per year. The area seems to be absorbing 60-80 percent of the maximum allowable dose.

The 76-foot stack at the facility discharges Tritium, Argon-41 and other isotopes when the reactor is operating. Says Jim Hardeman of Ga. EPD, "While it is feasible that discharges from the stack have affected these readings, radon gas and other natural phenomenon are also factors. This is not enough data to conclude anything for certain."

Even so, the pattern must certainly raise some questions. ■

OVER PLEASE.

P. 24 LOWER PART

continued from page 24

during the previous accident, to pour into the city's sewers.

The pool currently contains some 200,000 curies of cobalt, shipped in during the mid-'80s. Beneath a nearby building, about 6,000 curies of cesium-137 sits in another irradiator — with a half-life of 30 years, it has been reduced from an initial quantity of 12,000 curies after having rested there since 1960.

In addition to the cesium and cobalt, the reactor itself is fueled by highly enriched, weapons-grade uranium. Although the NRC issued an order in 1988 requiring that all research reactors be modified to operate on low-level fuel, Tech is among those which have yet to do so. The amount of fuel on campus is estimated at six kilograms — about half as much as is needed to begin the chain-reaction of a conventional "atomic bomb."

* * *

"From the beginning, we've used it for research and educational purposes," says GTRR Director Ratib Karam. "Now, we're using it nearly on a daily basis, for a variety of purposes. There are classes, and other universities may use it, or we may be using it for medical research... Any number of things, really."

In the mid-'80s, day-to-day operations at the Research Center were impacted by internal difficulties. Tensions between Karam and the center's Health Physics office became increasingly strained; under the organizational structure recommended by the NRC, safety staffers were to operate independently, reporting directly to the university president. Health physics personnel frequently complained of lax and unsafe practices on the part of reactor operators and staff, and even shut down in-process experiments on at least two occasions because of questionable procedures.

This reportedly infuriated Karam, who persuaded Tech's president to put all center personnel, including health physics, under his direct control. The then-head of the Radiation Protection Committee resigned in protest, and the NRC, according to records, expressed reservations. Even so, in July 1987, the reorganization was approved.

The following month, reactor operator Bill Downs — without the presence of a health safety officer, in itself a violation of safety rules — accidentally opened a canister of topaz gem stones that, in an effort to deepen their color, had been irradiated with cadmium-115. The radioactive cadmium spilled onto the reactor top and the first floor of the containment building. Downs, contaminated with radioactivity, told no one of the incident, left the facility, and rode home on a MARTA bus. Only the next day did health physics staff learn of the spill. Subsequent depositions showed that personnel were instructed not to report the incident to NRC inspectors.

But in December, research center staff members told an NRC inspector about the incident, and the federal agency opened an investigation. Subsequently, the center was cited for 25 violations of NRC regulations.

The same month, the NRC shut down all irradiation experiments and harshly criticized the way things were run at the facility.

But a supposedly confidential February 1988 appearance before the NRC by two health physics employees, Steven Millspaugh and Paul Sharpe, opened the doors to a wholesale shake-up at the center. The following week, the two were fired — then re-hired two weeks later, although transferred to different positions. They filed suit in federal court, and the copious files of that case offer a startling glance at GTRR operations during that period. According to depositions, relations had deteriorated to such a point between management and health physics staff that shouted obscenities, threats and harassment were routine occurrences. There were reports of sabotage — light bulbs broken above the cobalt pool, firecrackers placed in health safety door locks, allegations that human feces were discov-

COVER continued page 27

THE ATOM FAMILY: A NUCLEAR PRIMER

Atoms, those tiny little building blocks of everything we know and love, are a lot like us in many ways. They like to be stable. They like to bond with other nice, stable atoms to form wholesome, happy molecules that coexist peacefully with each other. And, like any other demographic group these days, they'd like to be better understood.

"Radioactivity" is the dysfunctional home-wrecker of this little world. An atom that gets a surplus or a deficit of neutrons below or above the optimum number for its "stable state" is called an isotope. Atoms hate being isotopes, and they get downright neurotic and will do almost anything to lose or gain the weight they need to return to normal.

As is sometimes the case in our macro world, these frantic efforts to overcome their problem are destructive to others around them. As they struggle to change their shape and get healthy, they emit particles and energy called "ionizing radiation." These emissions alter the electron balance of other atoms they encounter, making them codependent, or chemically unstable.

The number of electrons orbiting a healthy atom determines its ability to bond with other atoms. When a discharge from a radioactive neighbor blasts by, the number of electrons in this outer shell is altered (the affected atom is called an "ion"), causing breakups of previously happy molecular relationships, and the creation of new, forced and dysfunctional relationships. The ions sort of wake up after a bad drunk and find themselves married to Divine on a merchant freighter to Somalia.

If this reorganization of the molecular status quo happens to occur in your thyroid gland or your gonads, you have a big problem. These "new relationships" can manifest as cancers or genetic mutations.

Like a paranoid schizophrenic, the radioisotope will change its personality. By releasing a beta particle, the atom changes one of its neutrons into a proton, thereby making itself into another element, one step up the periodic table. By releasing an alpha particle, it moves two steps down. On it goes, shooting off energy indiscriminately, changing back and forth, trying desperately to get stable again.

Each of these events, these discharges of particles and energy, is called an atomic "event" or, as read on a meter such as a Geiger counter, a "count." Volume of radiation in substances is measured in terms of these events. One count per second is a becquerel. Thirty-seven billion counts per second is a curie.

There are several different types of radioactive discharge, and the effects of these vary, depending on what they hit. Most accidents involving radiation releases are generally described to the press in terms of their equivalent in X-rays. Gamma, X, and Beta rays are similar types of radiation. They have long range and good penetration power, but do relatively little damage. Imagine them as shots from a .22-caliber rifle.

Neutrons and high-energy protons emitting from an isotope pack more of a wallop. This angry isotope wants to hurt someone. These particles would be the equivalent of a .357 Magnum, less range, more stopping power. When calculating the effects of a certain number of curies on the human body, one multiplies by ten if the source is a neutron emitter.

The real bad boys here are the Alpha particles. Our poor isotope has gone completely schizoid, in his desperation to find himself. On our power scale, this is the hand grenade, very short range, poor penetration, but if it hits a cell in your body, the cell's dead. To get an idea of the body dose effects for alpha rays, take the amount of radiation (expressed in equivalence to X-rays) and multiply by 20.

Each of these discharges will have some effect on molecules they hit. What kind of damage will it do? As with a lunatic firing an automatic weapon into a crowded restaurant, the damage can only be predicted in terms of probabilities. This fellow would be a high-level risk, as his chances of hitting something and doing considerable damage are good.

A lone gunman on top of an office tower would be a low level risk, as his chances of hitting something aren't as good. But if he does hit, the person 300 yards away on the street is just as dead as the person in the restaurant. Low levels of radiation aren't inherently less dangerous, you just have a better chance of being missed.

Although still largely misunderstood (they're really trying to get normal, they just can't help themselves), these isotopes, like their psychotic human counterparts, must be considered dangerous. All we can do is lock them away and try to prevent them from hurting others as they travel the long, lonely road to radiological sanity. ■

COVER

continued from page 25

ered in a lunch bag in the staff refrigerator, safety devices deactivated, plain tap-water substituted for samples of contaminated waste water — as well as unsubstantiated reports that reactor operators had been known to sleep at the control console while the reactor was in operation.

In one particular case, reactor operator Downs playfully tapped the glass of the hot cell with a monkey wrench, chipping it slightly.

There were also reports by an NRC inspector that, during a follow-up inspection, Karam indicated to the inspector that he was aware of the allegations, waved a confidential NRC Allegation Report in her face, and said, "I know all about that." When she demanded to know how he acquired internal NRC documents, Karam said, "You know I can't tell you that."

In November 1988, the worsening scenario finally drew sanctions: GTRR was fined $5,000, and a blistering report landed on the reactor director's desk. Although the sum might seem paltry, an NRC official says that, by research reactor standards, it was quite high.

"Research reactors don't have much money to throw around," said the official. "Usually, the fines are in the $500 range." The NRC report noted that the violations were of a severity level that would normally have drawn a $2,500 fine, but that the "penalty was doubled because of your poor performance in adherence to procedures and radiological controls, and because of [GTRR's] failure to take prompt corrective action."

The notice also stated, "The involuntary dismissal of two health physics employees ... was viewed by the health physics staff as retaliation for discussion of safety concerns with the NRC.... "

An official familiar with the NRC proceedings says that the firings were not only directly in retaliation for the employees' cooperation with inspectors, but that the entire center seemed to "consider itself to be above the rules. The NRC had to point out to them, in writing, that yo don't retaliate against allegers. Yet still nothing was done."

GTRR paid the fine and was authorized to re-start the reactor.

That same year, Health Physics Director Bob Boyd was reassigned out of the facility. The current HP director, Rodney Ice, says he has a "good working relationship" with Karam. He confirms that the setup which has his department under the control of the director is unusual, but says "the NRC feels that, because of the past instances between management and safety staff, this setup is appropriate."

As to any questions of the facility's safety now, Ice is confident. "Our radiation exposures are the lowest they've been in years," he says. "In fact, most of them are from other facilities here on campus."

Even so, of the six violations cited since '88, three occurred in 1993. One of those was due to the fact that, when the reactor was operating at less than 1 megawatt of power, *no* radiation monitoring was conducted. Another involved a practice of disregarding required weekly radiation samplings if a holiday happened to fall on a Monday.

* * *

Operations and safety practices are one concern of the center's critics. Other concerns involve the regular release of radioactive substances into the air and sewer system. These releases have long been a focal point of environmentalists; one of the most vocal is veteran activist Pamela Blockey O'Brien, who has been fighting since 1981 to have the facility shut down.

Noting that holding tanks regularly release radioactive water, she digs into one her massive stacks of documents and pulls out a handful of papers.

"Look at this!" she says. "These are from the Georgia EPD [Environmental Protection Division] Environmental Radiation Report from 1979 and '80. They don't publish them any more — God knows why, probably afraid someone'll read 'em — but here's the stuff they've been pumping down those ratty old sewers for 30 years.... It was only last year they had a huge sinkhole on the same trunk-line over on 14th Street that sucked down two people. That's just a couple of blocks from the reactor."

The report documents the release of large amounts of tritium, and smaller amounts of cobalt-60 and -58, strontium-90 and -89, cesium-134 and -137, and manganese-54.

The figures, some of which seem extremely high, are nonetheless within the limits of federal regulations for wastewater.

"If this was drinking water, they'd be in big trouble," says a member of Georgians Against Nuclear Energy (GANE), the environmental group which has filed an intervention against Tech's license renewal application. "But the Feds are a lot looser on this — even though it eventually goes into the river, and *becomes* somebody's drinking water."

Dr. Karam, the center's director, acknowledges that tritium is regularly pumped out, but disclaims any responsibility for — or knowledge of — the other elements.

A former employee, who largely dismisses the hazards posed by the wastewater releases, nonetheless admits that particles of cobalt-60 occasionally turned up in wastewater samples.

"We might have released a few little insoluble cobalt specks into the sanitary sewer.... The water was supposed to be filtered as it went to the sanitary sewer. We did do that most of the time, but there were times that we didn't do it.... We did a lot to prevent that, but I wouldn't be surprised if a few little specks got out."

The GANE member takes a larger view of such dumping, noting that Tech is but one of hundreds of licensees regularly dumping radioactive waste into the sewer system.

"These releases might each be well within NRC limits," he says. "But licensees — hospitals, universities, industries — are looked at in a vacuum, evaluated by their individual dose to the community. No system looks at a licensee within the scope of the total radiological activity happening in the area....

"A lot of this stuff is water-soluble — tritium, for instance — so it will go on through miscellaneous treatments plants before going to the river. As to the cobalt, well, 4-micron cobalt particles are, in radiological terms, huge. It's analogous to dropping a bowling ball out of an airplane — it's perfectly harmless unless it hits something."

But the water isn't the only radioactive effluent issuing from the research center. Argon-41 and tritium are regularly vented from the reactor's 76-foot stack when it is in operation; the gases are retained, mixed with outside air, and then pumped out — again, while the levels are, in themselves, very large, the air dilution is deemed within regulatory limits.

"There are strict regulations in place to stop the ventilation system completely if there is any radioactivity in the air," says Karam. He says there is no direct monitoring of what comes out of the stack.

"It's measured before it goes in," he says. "Why do you need to measure what comes out? Also, what comes out is measured by the little detectors in place all around the facility."

Numerous "little detectors" — small badges known as Thermo-Luminescent Dosimeters, or TLDs — are placed at various locations around the Tech campus; most belong to Tech, but the state has 14 monitors in place, as well. An analysis of the EPD readings from the past 10 years reveals that, while most of the badges receive relatively light doses of radiation, a "plume" of much higher levels is formed to the southeast of the reactor — exactly where one would expect airborne radiation to drift, given Atlanta's predominantly northwesterly wind patterns.

According to figures provided by EPD, the 10-year TLD readings from four meters in the area averaged out to show annual readings 30 to 40 millirems higher than the remaining nine (one TLD is on the reactor building and, as expected, reads very high). This means these detectors are reading 60 to 80 percent of the maximum yearly dose allowed within NRC regulations.

"The thing to remember is that these are averages," says the GANE member. "The reactor's not

COVER continued page 29

continued from page 27

running all the time, so sometimes there could be a *bunch* of radioactivity blowing over that area. And remember, these standards were calculated for a 6-foot tall, 170-pound man at normal respiration — not for a 5-foot tall pregnant woman who goes out there to jog."

* * *

On page one of the GTRR license renewal form, which would allow the reactor to operate for another 20 years, a sentence reads, in whole: "No safety problems have been encountered."

The excerpt is but one of several which have drawn the scorn of reactor opponents, who point to the violations, fine and shutdown as evidence that plenty of safety problems have been encountered.

"Dr. Karam's relicensing application seems to have been written in the hope that no one will actually read it," scoffs a GANE member. His derision is echoed by longtime activist Pamela O'Brien, who has pored over the document with a fine-toothed comb, and takes great glee in pointing out its failings.

"You want a lie?" she asks. "Look on page 100: 'An environmental monitoring program has been carried on with the cooperation of the Radiological Health Section of the Georgia Department of Public Health since reactor start-up.'" Pausing for effect, she leans forward. "There's no such thing! I've tried to find 'em — they don't exist! ... There's a program to monitor radon gas, and one that licenses X-ray machines, but this Radiological Health section hasn't been around since Jimmy Carter was governor."

Calls to state health authorities confirm her statement.

She also points to the section dealing with potential health effects of an accident at the site; the radiation dosage tolerances, footnoted at the chapter's end, were gleaned from the National Bureau of Standards Handbook — published in March of 1952. (However, the standards have remained the same since 1959, despite repeated urging by assorted international organizations for the NRC to update them.)

O'Brien also ridicules the emergency plan outlined in the document. In a letter to the NRC, she writes: "The emergency command center will be in the machine shop, which is on the ground floor.... If the area is flooding, or going down a sinkhole, that's the end of the emergency command center. Besides, who ever heard of putting an emergency center inside the reactor building? That's ridiculous."

In their intervention request, which is to be the subject of an NRC hearing in January, GANE enumerates a number of objections to the reactor's relicensing, beginning with concerns about its stability. The petition notes that the reactor rests "atop Wahoo Creek Formation, a slabby, viscous and muddy medium-grained" type of rock which "tends to break across oblique plains." The group also points to the possibility of sinkholes; indeed, former employees claim that, in the mid-80s, a deep sinkhole actually formed right next to the containment building, and was so large that a worker fell into it. Karam denies any knowledge of such an event.

"The sinkhole I know nothing about," he says firmly. As to the building's stability: "We looked at that, and indeed, when it was built, the foundation is built on crumbled rock, but below the foundation is a [concrete] cup that goes down to solid rock, and the cup is basically the diameter of the containment building — about 82 feet in diameter — and about 11 feet down. So no matter what happens on the outside, that cup will keep the structure in place."

The intervention request also notes that other cities which have discharged high amounts of radioactive water into their sewer systems, such as Albuquerque, N.M., have faced immense cleanup costs. As to the cobalt-60 supply, GANE is concerned that a breach in the holding pool would expose emergency personnel to radiation levels of 480 million roentgens per hour — to put that in perspective, the dosage level after the Three Mile Island disaster was 30,000 roentgens per hour.

Perhaps most unlikely in the Tech request is a notation that, when the time comes to decommission the reactor, the estimated cost will be approximately $10 million.

"At the appropriate time, when the Georgia Institute of Technology no longer desires to operate the GTRR, a request for appropriation to the state Legislature will be made to cover decommissioning cost."

One must wonder how well such a request would be received by the tight-fisted Appropriations Committee under the Gold Dome — and what Tech would do if the request were denied.

* * *

As the Olympics approach, a major concern of many involved with the reactor — nuclear opponents as well as staunch supporters of atomic energy — is that the reactor and irradiation materials will offer a tempting target to terrorists. While a chain-link fence surrounds the compound, security is remarkably thin, and has been since the facility was built, say longtime employees. In addition, the reactor's containment structure is, at its top, just six inches of concrete, with a five-eighths-inch thick steel roof.

"Now, I believe in nuclear energy 100 percent," says a former employee. "But they have a tremendous amount of radioactivity at that university, and I just feel like it isn't worth keeping that there during the Olympics. It's just too dangerous sabotage-wise. That is a potentially very serious situation.... What disturbs me is that it is right there in the middle of the Olympic Village, and it's ideal for some nut to sabotage the United States and embarrass us."

While the weapons-grade uranium would be very difficult to make off with, it — like the cobalt — would be decidedly dangerous if the reactor were destroyed and the materials were dispersed into the atmosphere.

"I can't talk much about security, because it's classified," says Karam. "But we do have an emergency plan in place, that has been NRC approved."

An official with the Atlanta Committee for the Olympic Games (ACOG) says that concerns about safety are also being addressed by Olympic organizers.

"We had a parallel situation in LA in '84," says Scott Mall, of ACOG's Public Affairs office. "They had a low-level reactor at UCLA, and they secured it for the Olympics."

(In fact, the UCLA reactor's fuel was removed prior to the games, and concrete barricades were placed at access points to guard against terrorist activity. Apparently, no such plans are on tap for the Tech reactor.)

But extensive security measures are being planned, says Mall. "A variety of security measures are in place that the NRC has approved," he says. "Security will be very high, even just focusing on the Olympic Village.... There are 57 law enforcement and security agencies involved, including the Department of Defense.... The population can be assured that we will be very secure."

But even if local authorities discount the possibility of someone lobbing a mortar shell through the reactor building roof or tossing a grenade over the wall of the cobalt pool, critics always return to the position that the site shouldn't have been there to begin with.

"They should get rid of all of it, and be done with it," says yet another former staffer. "If you wanted to get a permit to build that reactor inside the city limits of Atlanta today, it'd never happen. It shouldn't have been put there to start with — they never did an environmental impact statement, they didn't have 'em back then."

"We think Georgia Tech [should] provide leadership by closing the Needy Reactor, and focus on the area of nuclear waste research and decommissioning of nuclear facilities," says GANE's Glenn Carroll. "As these reactors age and go off-line, [Tech] could help develop ways to solve the decommissioning dilemma."

GTRR Director Karam, too, has his vision of the facility's future.

"What we do here — the bottom line — is research and service and education of the public," he says. "That's all we've been doing, and all we will be doing." ■