Please forgive mistakes. I had no time to rewrite it, as I kept getting ill.

May 22nd 1996

(from first paragraph of letter, dated May 24, 1996)

TESTIMONY TO THE HONORABLE JUDGES BECHHOEFER, KLINE AND LAM OF THE ATOMIC SAFETY AND LICENSING BOARD, ON THE MATTER OF THE GEORGIA INSTITUTE OF TECHNOLOGY NEELY NUCLEAR RESEARCH REACTOR AND PARTS OF THE ASSOCIATED BUILDING COMPLEX WHICH FALL UNDER THE TERMS OF THE ORIGINAL LICENSE.
FROM PAMELA BLOCKEY-O'BRIEN. (Member, I.F.O.R.)

(This Testimony is to be considered part of my "2.206 Petition under 10 C.F.R. Chapter 20 before the Executive Director of the NRC and the NRC Commissioners. It is also given in support of the G.A.N.E. proceeding against re-licensing the above.)

Honorable Judges,

I offer this testimony to the memory of JANET LOWE, who was working with me many years ago to expose what has been happening at this facility. She was killed in a mysterious hit and run event, a few days prior to her giving testimony against the Georgia Power Company and some weeks before a press conference and investigation we were working on was to be announced. About 15 years ago she was the G.A.N.E. representative. Because Janet was a Jewess, I offer these words from the TALMUD :"Every contoversy which is for the sake of Heaven will in the end endure, But one which is not for the sake of Heaven will not endure in the end."The words "for the sake of Heaven" being defined as "to establish truth" in the Commentaries. (The Living Talmud, The Wisdom of the Fathers. p.216, Selected and Translated by Judah Goldin.)

So, Janet, "for the sake of Heaven", this one's for you.

In addition to the many letters submitted under my 2.206 already I will cover many issues. I was going to start with bad overall management, things like : what took Tech so long to discover scientist Gruen (spelling ?) had been bashing holes in the wall of the old Civil Engineering Building and dumping contaminated rags and liquids in the walls (Source, Mr. Lupton and Mr. Boyd) and poor Mr. Boyd had to tear the wall out to try and clean up all the Cesium-137. but I decided to go first with the "good ol'boy/cover up" angle first that NRC Inspector R. Long and G.A.N.E. have referenced. It needs detailing not only to show how this awful situation has existed so long, but to show, as Senator Abraham Ribicoff once said in regard to the NRC's predecessor the Atomic Energy Commission , it becomes "difficult to determine in the organization scheme of the A.E.C. where the Commission ends and the industry begins." (p.39 "Meltdown, the Secret Papers of the Atomic Energy Commission" by Daniel Ford, former Exec. Director of the Union of Concerned Scientists.)
I have made a chart on this : In 1937 the Industrial Development Counc was formed in Georgia, it incorporated in 1946 . Later the so-called EES, Engineering Experiment Station the original name for this program entered the picture at Tech, the sub-critical reactor was brought in to it in the 50's thanks to the AEC, (the forerunner of the NRC) by Georgia Tech and the Board of Regents and the Georgia Power Company, the purpose being to train reactor operators across the South and to turn the south into a nuclear bastion from a power and defense perspective. ("Ga. Power Looking to Atom" A.J.C. Sun.11/16/58 /and Boyd.)

as well as Navy nuclear submarine people

I believe the sub-critical reactor fueled with uranium slugs is the one you saw stashed near the stairs. That was followed at the Engineering Experiment Station by the 1 MW reactor i.e. this reactor later upgraded to 5 MW. The EES was a research facility loosely tied to Tech, but NOT a part of TECH. By 1971 it had a budget of $7.2 Million, mainly funded by the DEPARTMENT OF DEFENSE In 1971 Dean Thomas Stelson first shows up helping to push a merger of some type of the EES with Tech so it can get its money-grubbing little hands on federal funds (Atlanta Costitution 4/1/71 Experiment Station, Tech Pushes Merger Plan) It didn't seem to bother anyone that it could be illegal under Georgia law according to then State Rep. Clayton Brown Jr. ("Merger at Tech in Peril" Atlanta Constitution 4/21/71) This was the same Stelson who pushed the re-organization plan putting Dr. Karam in charge later, that caused the huge problems,part of the basis for this GANE action. Admiral Rickover, father of the "nuclear Navy" had already set up a contract between Westinghouse and the A.E.C. a sort of co-operative agreement (see "Meltdown") , so when in 1972 the EES REACTOR facility had to encapsulate 2,500,000 Curies of Cobalt-60 for Westinghouse and Nasa that resulted in them contaminating the "heck out of the place" (Robert Boyd former RSO) including the sewers, where they nearly lost Atlanta (Robert Boyd) the NASA/Westing-house/Tech relationship was in full bloomI am not sure if the EES wa was fully merged into Tech, but Ron Bell the CFO of both the Georgia Tech Research Institute and the Georgia Tech Research Corp. said to me GTRI used to be called the EES (April 8th 96 phone conversation) In any event, in 1984, the Industrial Development COuncil became both the Georgia Tech Research Institute (GTRI) and the Georgia Tech Research Corporation (GTRC) Both are headed by the Preside of Georgia Tech Wayne CLoughBoth have the same CEO,CFO Agent and Secretary , the only difference is the Applicants Attorney on GTRI, who is listed as PS ARKWRIGHT, who I believe was a head of Georgia Power Co years ago, and a George H. Lanier has that position with GTRC, Both GTRI and GTRC are listed at the Secretary of States Office as PRIVATE CORPORATIONS, and as non-profit corporations. Both have no business license (a requirement of the law) and according to Dun and Bradstreets Million Dollar Directory for 1996 and the Atlanta Reference Library (April 16, 1996 phone call) the GTRC made $136,000,000 in 1994 has 1500 employees and was founded in 1937. The Secretary for both GTRI and GTRC is the former head of NASA, Admiral Richard Truly,Techs PR man told me the reactor is also some kind of sub-unit of the Georgia Research Alliance (formed by former Gov. Ger Harris and others and the Atlanta Business Chronicle 10 9.92 says Georgia Tech is racing into Biotechnology and quotes one Robert Nerem professor and co-chair of the new health science and technology committee(who contaminated the hell out of his lab, hallw -way and peoples shoes had to be thrown away.) The GTRC has a contra with Neutron Technology Corporation of Idaho (where INEL is,that has ties to Tech (Dr. Karam) and the reactor, Neutron Tech and GTRC's contracts involve the leaking Bismuth block to then do so-called Boron Neutron Capture Therapy to kill a type of brain tumor called GLIOBLASTOMA. The Dept. of Energy, according to Dr. Ice, rated Techs reactor the best in the country for Boron Neutron Capture Therapy. The Dept. of Energy has huge contracts with the reactor over the years. When the A.E.C. got

split up by a disgusted Congress into the Nuclear Regulatory Commission and the Dept. of Energy, it became the DOE's job to push nuclear weapons, nuclear power and so on.Many space shuttles have nuclear "payloads" . Dr. Ice has a distinguished military career and is an ardent proponent of BNCT for the treatment of glioblastomas. Admiral Truly was an astronaut. A prime cause of glioblastomas is solar flares in the irradiation of military space crews, other causes of gliob'astomas are mustard gas exposure, radiation from low energy high dose radiation, electromagnetic radiation/power lines, petro-chemical and solvent exposure widely used in engineering,construction and petroleum industry and vinyl chloride exposure used in the same industries. The backers of Neutron Tech in the BNCT /leaking bismuth block/ venture with GTRC are Morrisson Knudsen Engineering and construction and Vestar Inc., a pharmaceutical co. . Solar flares can also cause endometriosis in women. Wouldn't it be better if they all, (Admiral Truly, GTRC, Dr. Ice, the DOE, Neutron Tech etc.) just told all the military space crews and high altitude pilots and so on that that the job related exposures can give them glioblast blastomas down the line, forget the billions they want to spend o constructing space stations and use the money for free national hea health care and cleanup of this nations over 40,000 potentially radioactively contaminated dumpsites ? And the other industries can find non-polluting alternatives to what causes glioblastomas. Tech does not have the permits from the NRC for all this anyway according to the NRC's responses to me. and this dump of a reactor is not the place to attempt it anyway.

The State Department of Natural Resources Radiation Protection Division, which, like the Nuclear Regulatory COmmission, is also funded by its licensees the nuclear industry, also holds contracts to the tune of up to nearly 100,000 dollars a year, with the same GTRC. All the GA. EPD Radiation division environmental surveillance seems to do, is go out and collect the samples and do the odd oversight (I am not speaking of the inspections here) as under the terms of the contracts, which are attached, the GTRC not only runs all their tests, whcih includes the ones in their own backyard at Tech, , it does it for EPD STATEWIDE at all Georgia Powers plants and outside the DOE Savannah River Facility, -it gets worse - they help write all the Environmental Radiation Monitoring report books and reports for Ga. EPD radiation division, there is a provision too that Ga. EPD can interfere in Tech publishing any data in research papers ,presumably on the effects of radiation and pollution, that they don't like, and to top it off. the internal files have reports that show Tech/GTRC saying the on campus soil contamination is from the facility, that does not appear in published reports. Internal files show that TLD's have been missing, , that there is contamination all over the place,— that the contracts specify Dr. Kahn, who contaminated his own lab, ~~that~~ and that he is on the advisory committee for the DOE's Savannah River site (when Tech can't even keep from exposing the students)—that Dr. Stelson signed one GTRC contract with EPD, ~~for~~ GTRC— that Leonard Ledbetter the former DNR Commissioner who left under a cloud of controversy and then joined Law Environmental ~~the~~ company who a) did the non-site specific earthquake study, the NRC tried to tell me showed the reactor was on stable ground, in a non-earthquake prone

Signed contracts

region. b) the same Law company that did the soil bore tests under the reactor site and co-60 storage pool that show they hit groundwater a few feet down like I said, and that it is not on the famous rock at all, but on a combination of crumbling rocks and sand and silt (let alone that the original 1960 Safety Analysis says its on a MUD FLAP which I'll get to later when I tell you how they pollutted the Chattahoochee River and a lot more besides) and the EPD/GTRC contracts do all the state drinking water testing too -which may explain why the drinking water radiation analysis part of the tests provided to the City are exactly the same for three years in a row- and the Radiation Surveillance environmental monitoring computers are directly tied into Techs system. EPD's Mr. Hardeman told me all their reports were on computer printouts now, left me a note to that effect even. , but I found out files existed, and when I wanted to see them, 4/4/96 I was told I really didn't need to as I had the printouts, that they were boring, that after all there were about three linear feet of them, real boring, and besides, there was nowhere to sit. I said I was coming anyway and I'd sit on the floor. You would not believe what I found, and I only saw a fraction of the files of Mr. Hardemans. I'll get to it in a minute. I also saw Mr. Hills licensing files done by his inspectors on this complex, which the pool also falls under NRC/you regulate, the pool that contains the spent fuel rods as well as the cobalt -60. Mr. Hills inspectors tore Techs miserable little program in shreds I'll get to that too. Mr. Hardeman also raised internally major questions about the cobalt-60 and the contaminated water released to the sewers, not in The co-60 is encapsulated, it is not meant to be leaking, Dr. Karam told me the pool water was totally clean, though I have my doubts, but the co-60 is also an activation product produced in the reactor and it comes from the reactor too. NRC reports keep saying it is from the cobalt in the pool, if it is, the sources are also leaking, leaking particlesperhaps since the sources are like metal chips and wafers encapsulated.

published book reports for the public.

CONTAMINATION IN WASTE WATER ONLY

I have different sets of printouts and books from EPD, some things are not on one printout, but on others, or not in the books, or in books and not printouts. Mr. William Cline helped write an early reactor safety report, he then goes to join the NRC one signature shows he's on an oversight section. EPD does not take the waste-water grab samples itself at Tech, it's a "good faith" sample given by Tech according to EPD's technical support person at Tech Mr. Blackmon. Mr. Cline set it up like that according to Mr. Blackmon. Mr. Blackmon led me to believe he'd take tests round the reactor for nearly two years, then I was told he wasn't allowed to by his superiors. Mr. Hardeman said his boss, Mr. Setzer who sits in a downtown office and attends conferences (as opposed to the rest of his staff who are at the airport) wouldn't allow it and his job was at stake if he pushed it. EPD refused my phone calls so many times the secretary asked me how it made me feel. These are all the tests the NRC did not look at to help them deny the first part of my 2.206.* Betty Revsin was an NRC inspector who went to join Tech. Her campus surveys list a background of counts per minute as being betwqeen 40 and 400. 200 was the cpm in the

* THEY ONLY LOOKED AT ONE PRINTOUT SENT THEM BY EPD.

mium contamination incident in one area.

One area in the Bunger-Henry Building had 2000cpm (Revsins notes)
Nuclear Safeguards committee members have included/include a form reactor RSO, Mr. O'Hara, Mr. Ewald of Georgia Power, E.M. Cobb of Georgia Power, Dr. Kahn who consults for DOE/Savannah River Nuclear Site and is involved with the GTRC Contracts with Ga. EPD Radiation Division(also signed by Mr. Hardeman of that Division, and Mr. Reheis now current DNR/EPD Director) and Mr. Len Gucwa of Ebasco Services and Westinghouse on documents. There was a huge scandal involving Ebasco and a company called Moreland Altobelli in Gwinnett County detailed in the now defunct"Daily News"of April 6th and April 7th 1992. Moreland-Altobelli is headed by the former head of the Ga. Dept. of Transportation (D.O.T.) Tom Moreland. The DOT held radioactive work connected with the reactor,Mr. Boyd told me there is some source buried next to a highway, and in the files at EPD, I saw it listed Radiation tests done for the highway Dept and they were leaving contamination in place (Oct. 20th 1977 letter to Mr. Simamis.) Moreland-Altobelli is part of WSGI (Williams Service Group Inc) It is a Virgil Williams company,(one of many) his companies also do nuclear plant work, coatings for the TVA. Dr. Karam told me back in 1995 that they also do testing for TVA, Duke Power+Georgia Power.Mr. Williams is a member of the powerful Georgia Tech Foundation (see Atlanta Journal Constitution excerpt). He is a confidant, and financial supporter of the Governor (widely reported by AJ & C over the years) I first appealed to the Governors office about this situation by phone, May 11th 1995, as I had sent the Governor a letterwhich wasn't answered. After 5 attempts, enduring verbal abuse (like I have to endure from some EPD staff who don't understand the issues)+being cut off, they told me they had sent the letter to Reheis (who signed the GTRC contacts) and I found out from Hardeman it was put in <u>his</u> file. .Approx. late July 1995 I called the governors office to try and get a meeting with the governor about this whole situation which was basically useless as the proceedure would have been enormous and they couldn't guarantee it anyway. I also left a message for Tech President Wayne CLough to call me. He never did. I said in the message what it was about. March 14th 1996 at about 4.30 or so I got through to a Jeff McCord in the Governors Office and told him about the problems, that the former medical doctor at Grady Dr. Holmes had told me he would have to be evacuating the hospital if there was an accident there after I told him what was there (Dr. Holmes was a prominant well respected African American physician) he also said it sounded like downtown would have to evacuated. He was the radiation doctor who would have recieved patients in case of accidents etc at Tech, listed on in the Revised SAR. I spoke to him Nov.9th, 1994.After this appeared in my 2.206* news reports said he was ousted and then I heard he died. Months afterwards NRC contacted the hospital about this but it was too late)I told McCord about my 2.206 and I had the documents to prove it and wanted a meeting with the governor if need be. I told him I had written to the Governor etc. and that the state attorney generals office was being used to fight something contrary to the public good. He said the governor had to rely on what he was told by his State people but would talk to the governor and get back with me. a) he never got back with me, b) Later, in the State files, I found the attached memo dated 3/19/96 from Mr. Hardeman to BRUCE BOUGHTON

* THAT I SPOKE TO HIM

of the Dept. of Defense Nuclear Emergency search Team (NEST) which shows that 1) they were not going to do anything about analyzing the Georgia Tech situation unless someone quote:"started yelling about it" -'someone' meaning someone they all did not ridicule obviously. b) it shows that there is some type of terrorist threat.
c) They do not understand the health consequences (as in instant death) or slightly delayed death depending on what sources got stolen. It is not just the 300,000 curies in the pool alone of co-60, there are two inventories the second is attached as you have the first, THEY DIFFER.

The State of Georgia and Savannah River Site uses the term mCi to mean millicuries, this is important when reading the inventories. You will note differences between inventories. The NRC Commissioners have the power to order the cobalt 60 out. The pool is also used for spent fuel storage which is about the most radioactive stuff on earth as you know.

The problems in the late 1980's concerned gemstone irradiations which went wrong. Due to the "Creative Loafing" article of Dec. 1994, GANE got a call from a jeweler, an older lady called Ms. Ackerly. (AND, for the record, nothing better happen to her) she was concerned, as she deals with stone dealers, and she had overheard a conversation in her shop approximately in 1990/1989 . I spoke to her about it. she said ston dealers rented space in there, one had said that "they'd spilled all his topazes" another that "they'd burned up his tourmalines." She was concerned as she had recently read a notification that only one place IRT, San Diego, was allowed to do this. She was concerned about the exposure to women and children from this, and indeed at first NRC was concerned and stopped it then re-allowed it under dubious circumstances noted in the attached news article from "Common Cause" Magazine March April of 1990. Ms. Ackerly thought the stone dealer would want to talk to Ms. Carrol. To cut a long story short, when Ms. Carrol tried to talk to him about it, she was basically told to back off. I called NRC about it (who months later informed me they were allowed to irradiate them in experiments, if they were not sold to the public.) At the time, Mr. Bassett and Mr. DiMiranda got very concerned and called me back and said they'd had a meeting on it and were moving on it, and I assured NRC that Ms. Ackerley had told me she would meet with them and help any way she could. There is more to the story in that I also contacted a customs officer and an agent with the DNR/EPD Environmental Crimes taskforce who I thought, from what I had been led to believe, was also with the GBI (I only recently found out their offices are at the GBI, but they worked for DNR) to get more help. I gave them all each others phone numbers. To this day, NRC, no one, ever contacted Ms. Ackerly. But I did some checking. The one fellows name was Tim Rourke. The phone books also said his name and that it was TRI/Tim Rourke Imports. I checked with the Secretary of States office and found out that an officer of the company was one Felker Ward. Mr. Ward enjoys a certain level of publicity as the attached news articles show.
First, he sits on the Board of the Department of Natural Resources(DNR) 2) He was a recipient of a Georgia Power lot lease at Lake Burton about which there was controversy. 3) He was among loan guarantors for Mr. Andrew Young who of course is with Law mentioned earlier and Law also got Olympic Contracts. In addition, according to Mr. Boyd, when he was there, gems would be sunk down the pipe at the pool and the proximity to the co-60 irradiates them. Further, according to a German journalist,

WHO INTERVIEWED

a former reactor staff person, gemstones would be put in the pool, hundreds of pounds, in special containers with holes in and the cobalt-60 put on top and they let them be there two weeks. That it was done until at least 1991, and that NRC knew .By calling IRT in California, the reporter found out that if topazes are previously irradiated with neutrons ,normally in a reactor, the price is very expensive, and one has to wait half a year before marketing. The use of cobalt is a bit cheaper. In arguments with NRC's Mr. Collin on what I believe is a disgraceful process,he maintained that only neutron irradiation would be dangerous (i.e. for the public when irradiating gems) . As the co-60 pool is also used to store the spent fuel rods, and as they would give off neutron irradiation I am concerned about all this and feel it was all shoved under the rug/or the pool! If there is time I will get back to things like NRC sending me (i.e. Mr. MIRANDA) sending me the partial denial of my 2.206 which was over 600 pages short. When I found out about tnat months later, and raised hell about it, at first NRC did not want to send it to me maintaining it was just footnotes, I was demanding to speak to Russell about it (the executive director who was responsible for it too, finally Mr. Mendonca tracked it down and sent it all to me as he had thought I'd been sent the complete decision and that it was only the forty odd pages. The 600 plus extra pages were very interesting. for one thing they partly proved what Mr. Bassett had agreed,with me on, namely,that he knew there were items or issues I had under my 2.206 which were not addressed and that anyone could see that,and when I asked him if he would tell that to a judge in a court of law, he said he would if he had to, so you can ask him. (Conversation Aug. 4th 1995) and I can tell you details about Mr. Collins and and I think a lawyer or some other NRC fellow and Oscar D. Miranda calling after Glenn told you at the first testimony, that Mr. DiMiranda had told me his people had told him there would be contamination of the sewer lines etc. at Tech (which they have refused to test these three years now) and Mr. Collins backtracking on telling Oscar there would be contamination, and we had a huge argument, but as I didn't wan't Mr. Dimiranda to get into trouble I let it all go,let them have it their way. And on being told I couldn't speak to Mr. DiMiranda anymore and on and on. But I want to get to the massive contamination and pollution of the Chattahoochee and the campus etc. What I have told you so far should show you that there IS a good ol boy network. Oh, I know how Ms. Long must feel, NRC and EPD the Governors office staff, Tech have caused me great emotional distress that has made my health problems worse . Like her, all I have been trying to do is protect the public. She must suffer greatly. I also know that there are official and unofficial reports. For example, things were left out of the report on the fuel removal . I questioned Mr. Bassett on some aspects and found it out. It leads into the campus contamination issue : Mr. Bassett and another inspector also crawled around under the pool area. What is not in the report is that they made quick measurements and scooped up some surface dirt. I had been asking for proper* core samples from beneath the reactor itself as well as the pool etc. After a lot of "back and forth" and him not wanting to admit things, he said he thought measurements had not gone over 1 Millirem an hour using a n XETEX monitor in the crawl space the water washes the soil out from under, which of course goes further onto the campus and sinks into the groundwater and affects micro-organisms and insects etc. If it was always 1 mrem an hour thats

* NOT SCOOPED UP

8,760 mrem a year. If we cut that in half even, it is still over 4,000 mrem a year going out from under the crawl space to the campus environment, in some manner.
The 1960 original Safeguards report for building the reactor is incredible. Which is why I believe the current SAR was revised. leaving out absolutely vital information. NRC knew this -Mr. Mendonca told me they had read the original and gone over it when I asked him if they'd looked at the one that wasn't revised and he was mocking me that I wasn't a geologist and NRC geologists had looked at all associated documents - not understandi that because of the issues I work on I have had to do vast geological research. - and the EPD has a copy of it in their files and the EPD Radiation Division lied and were misleading in th the partial response to my 2.206. what is on this chart I drew, ... states that the large scale topographyof the region is such that the reactor site lies near the head of drainage of a LARGE PART OF THE SOUTHEAST (pages 23 and 24) that the Ocmulgee River basin at its nearest point is 1.9 miles from the reactor — the Flint's nearest point is 8 miles, the Etowah-Coosa-Alabama basin is 17 miles northwest and the Chattahoochee River basin is 10 to 20 miles wide in the vicinity of Atlanta. But guess what, they didn't care. Later in 1969, Georgia Tech (and the DNR and AEC who allowed it) were dumb enough to stick 2.5 curies of Kr 85 and 5 curies of tritium in the headwaters in the CHattahoochee and to also do similar in the headwaters of the Flint and South Rivers (EPD files and attached documents from the AEC, Tech and the State) when they must have known that the poor fished all down the river, and animals did drink from it having little other sources. and that it would have affected La Granges drinking water intake. and pollutted the river even further.

Page 28 shows how the water pooled under the reactor itself. Page 24 details site specific topography showing the surface drainage at the site would concentrate in the depression west of Atlantic drive and the runoff would come from 10 acres. It details overflow could go east and west of Atlantic drive roughly 20 acre feet could be temporarily ponded in the depression the equivalent of 16 inches of rainfall on 15 acres draining to overflowing catch basins, EXCLUSIVE of 6f the 10 acres . It states how waste carried by surface runoff (for example radioactive crud that's deposited on the "fake" containment dome, or on the roof of the lab area and on vegetation from air borne[illegible] deposited - my addition) may be deposited on the ground in these depressions , or may infiltrate with water into the ground, or it may be carried into the STORM sewer . EPD test of 2/20/80 in the runoff ditch showed vegetation/grass with 8800 pci/kg of Be-7 and 61pci/kg Cs-137 The water itself contained (2/29/79 contained) a set of contamin -ants including tritium (not listed in one of the printouts) these are in pages 154,153 and 156 of the 1979/80 report book EPD gave out After I raised questions on what was dumped to the sewers and about surface runoff, they did not list them in the other books e.g. 85-87,88-89 but Tech took samples of water in 1985. I found in EPD files for waste water (6/20/85) cobalt 60 cesium 137 (22 pci/1) and alpha and beta emitters. . Samples of water taken and referred to cryptically in March 1985 at GT 176 ; Tech says are in monthly reports and are not in printouts. Not in three printouts they sent me, and are not in the book.

Please remember tests of what was dumped to sewers are all messed up , not in some printouts etc. I could go on, but as they told me, it gets boring....(documentation of tests attached)

What is dumped to sewers is of vital importance. As you know it is well documented that there is no safe level of ionizing radiation furthermore, the health effects of exposure to low levels of ionizing radiation have been detailed in the most recent report of the National Academy of Sciences National Research COuncil entitled the BEIR V report (1990) This is in effect a report of the government of the United States. Despite the fact that the way it calculates so-called background radiation- which the government has inflated over the years-are ridiculous, in that, for example it averages everything out and divides it by the entire US population when we know infants in utero, children women the old and the frail and then men, in that approximate order, are diferently affected by exposure, with infants in utero the most affected, and despite the fact they try and say a massive part of exposure is due to radon in water, when in fact vast areas of the united states contain less than 1 pci/l almost half the nation, and, where higher levels are found they are often suspisciously close to, or in areas of uranium mill tailings piles or nuclear facilities, and some of the figures were provided by the DOE, and help was given by DOE associated universities and such, —the 400 odd page report contains some ghastly information. I draw your attention to pages 12,13 and 14 and 15 on effects to DNA , both direct and indirect, and energy absorbtion taking place in water, since cells are made up of 7o% water, and I would add that tritium (H-3) in water, subsequently enters every cell in the body . - the natural human body burden of tritium being only one billionth of a curie - hence, the dumping of tritium indeed any radioactivity to water is serious. Cobalt -60, is not readily soluble in water either, however can give off deadly doses, Atlanta has a massive problem with so-called "combined sewer overflows" indeed huge daily fines are being given because this problem has not been addressed, after even moderate rains the sewers overflow, . This problem existed back in the 1950's and 1960 when the original Safety report was written, hence page 29 shows that in dry weather all of the flow in the trunk sewer the waters from this reactor and hot cell , pool etc. NRC licensed goes to, normally, would be diverted into an interceptor to the north, and go to the Chattahoochee via the Clayton Sewage Treatment Plant, from whence the radioactivity can't be removed, though some is trapped in the sludges, which are then burned, at the present and then the ash is incorporated into bricks and other building materials. Back then, the sludges got routinely dumped to the CHattahoochee anyway. BUT, in wet weather the flow in the sewers is too much, so it bypasses the interceptor, flows instead via what is now called Tanyard Creek, but back then was an open ditch, DIRECTLY INTO PEACHTREE CREEK, AND FROM THERE DIRECTLY INTO THE CHATTAHOOCHEE RIVER. this was expected to happen back in 1960, 5 to 7 times a month, now it is more frequent. IT GETS WORSE The drinking water intake for the City of Atlanta the cities of Marietta, Smyrna Hapeville, Forest Park and military installations like Dobbins is only 150 yards upstream from the mouth of Peachtree Creek. Page 31 states " THERE IS THE POSSIBILITY OF A FLOOD IN PEACHTREE CREEK WHEN THE STAGE IN THE CHATTAHOOCHEE IS LOW. THIS COULD RESULT IN UPSTREAM MOVEMENT OF THE FLOODWATERS PAST THE CITY WATER INTAKE

When the pool for the highly radioactive spent fuel rods and the cobalt-60 siphoned down three feet the night of January 31st 1983 and quote "since no water was found under the concrete flooring and it had not gone to the holdup tank they surmised that the water had gone to the sewer system although that valve was found CLOSED on the morning of Feb. 1st 1983" They calculated a release of 2700 gallons. . Two things are noteworthy, one is that Bob Boyd told me that under certain circumstances they found that the valves could backflow into the city drinking water system (ask him about it) and it had to be corrected . . If it went to the sewers, and they do believe it did, not only did they go down the wrong manholes to sample (EPD) they sampled in a blinding rainstorm Mr. Hardeman told me he would never forget. HE + AL GOODEN, NOW WITH NRC. The requested samples were picked up two days later from RM Clayton (from the constant sampling) requested by Mr. Hardeman to start at 1700 hours on 1/31/83 through to 0800 hrs on 2/1/83, The obvious point is that 1) they were surprised, according to Mr. Hardeman, that the samples did not appear to be as high as they thought they might be, and 2) with the heavy rain, the contamination in the lines that would have existed would have been thoroughly washed into Peachtree Creek bypassing the interceptor, and little reached the treatment plant. The interceptor is 7000 feet north, and even back then p. 29 states that Since the interceptor flows nearly at its capacity in DRY weather it is likely that surface run-off from any appreciable rainfall would also be diverted to the ditch." I.e. Tanyard creek. They assume a 24 hour rainfall of only 0.1 inch would fill the interceptor to capacity.

How many times has Tech dumped to the sewers and it has bypassed and gone to Peachtree Creek and directly to the CHattahoochee ? How many times did it hit the drinking water intake ? They are meant according to the original specifications to hold up the water they dump half way through for 24 hours, do more sampling and then continue to dump. . But Betty Revsin in a letter to EPD, in the attachment part, dated Aug. 3rd 1990 says : "Over the past several years , the only radionuclides determined to be present in the liquid waste were tritium (at a very low level) and trace quantities of cobalt-60....due to the types of radionuclides observed in the liquid waste , no holdup time for the liquid waste is routinely planned, instead, discharge occurs when the tank is full." She not only is stretching the truth from here to Mt. Everest and back accordin to the reports I have enclosed , she thinks in another sentence the two tanks that hold 1500 gallons each are termed "low level" because of their low volume. This is pathetic.

I also refere you to inspection Report and allegations of March 9th, 1987 on this issue done by NRC. It's appalling.

The NRC and Dr. Karam give out the guff that the high TLD readings at one location are due to the weather (GAWE) also referenced this, e.g. heat or cold. This is ridiculous. The original Safety Report details how the size of raindrops, wind speed, wind direction stability or instability of the atmosphere, and so on will affect the pollution from the reactor over pages and pages and pages. how large raindrops will wash out particulate and gaseous matter and deposit it on the ground faster,. The high readings are due to the crud they release.

John Richards of EPA/ERAMS (whose "COMPLY code" NRC threw at me in my 2.206,-which is computer modelling bearing little resemblance to the real world) told me, before he knew I was doing a 2.206,

(LATE 80's | EARLY 90's)

that when he was a student at Tech, the Argon was going out the stack on a daily basis at two and a half times background. I put this in the 2.206 but didn't name him. I'm naming a lot of people as I am sick of what they are doing.

I asked him to monitor air during fuel removal, but he didn't do it. Just like I asked Mr. Bassett to be sure the roof plenum that vents everything out the hot cell areas would be monitored during fuel removal Not only was it not done, (and I reminded him I'd asked for it and he agreed I had (april 1st conversations) the famous particulate sampler on the line was evaluated (they've been evaluating for ages) and not at all checked. the reason given for not testing up on the roof was that they had a monitoring device in the line, so I asked well what was the set point for that alarm? and he said he hadn't written it down, and I asked who all my requests go through, as I know they seem to cut him off at the pass, and he said it is usually someone from Mr. Uryck's office or a division director or alternate and named Mr. Mallet and Mr. Collins and a lawyer (why lawyers?) I also asked who climbed the stack to read the monitors. He said usually the HP technicians, but I know from a prior NRC report they are not doing it. He said they report it in the annual reports. That's the problem, the Neely Center could write in their reports that they are in reality all Martians and the NRC would believe it.

Here is a chart of DIRECT RADIATION WHICH THE CAMPUS AND THE STUDENT GET EXPOSED TO. In transit doses for students are higher than at the huge Trident Nuclear Submarine base at St. Marys.

THE SAVANNAH RIVER NUCLEAR SITE, A D.O.E. SITE HAS 96 TLD's ONSITE in the worst areas. You know that the SRS site is about the most contaminated 300 square miles in the nation (outside of the Western Shoshone Indian land AKA the Nevada Nuclear Test site). Of those 96 TLD's at SRS 14 were over 100 mrem a year, 3 over 200 mrem/year one over 300 mrem/yr At the SRS site perimeter there are 179 TLD's (allowed DOE site perimeter exposure must not go above 100 Mrem/yr) 3 were over 90m/rem year but below 100 m/rem year. 58 were below 60 mr/year, all the rest were between 60 and 90 mrem/year.

You know what's coming, missing TLD's and all, of the 631 TLD measuremen for direct radiation exposure reportedly taken by Ga EPD (AKA Tech/GTRC) between 1/24/78 and 3/4/96, at between eight and 14 TLD locations, there were two low measurements in 1982 of 49 m/rem year plus/minus a few points (which should probably be used as site background) 138 measurements were between 100 and 200 mrem/year three between 200 and 300, seven between 300 and 400, 7 between 400 and 500 , 2 between 500 and 600, 1 of 726 Mrem/yr plus minus 73 on 12/20/88 and one of 997 Mrem year plus minus 36 on 3/18/85

The majority of the remainders were in the 70's 80's and 90's.

THERE ARE the TLD's at th e former Lockheed Nuclear Aircraft Lab, which contained nuclear reactor and hot cells and lab like here, and which is now euphemistically called the Dawson Forest Wildlife Management area. When it was decommissioned, some of the liquid radwaste got poured into a hole in the ground and they put a rock on top, (ask Mr. Boyd about it too) they fenced the highly contaminated cooling off area etc. back in the late 60's the people who lived in the nearby houses were on wells that were contaminated in state reports. You can bet the people were assured it was OK, it doesn't matter, they're dead now.

By 1993 the area of TLD 's 1,2,3, and 8 had readings between 84 mrem

12.

year and 293 mrem/year. THIS AREA IS CLOSED TO THE PUBLIC DUE TO HIGH CONTAMINATION. YET GEORGIA TECH COULD EXPLODE A NUCLEAR DEVICE ON CAMPUS AND NEITHER THE NRC OR THE GA. EPD (EPD) WOULD PROBABLY DO ANYTHING MORE THAN SAY "WE"VE ANALYZED THE SCENARIO AND FOUND IT NOT CREDIBLE" which is their favorite phrase.

Another chart I made shows a lot of things you can read later, but the H-Area at Savannah river had highest Cesium-137 contamination in soil at 1.ol pci/ gram or 1010 pci/kgbut Tech gets to have 1500 pci/kg 3/18/85, and 1400 pci/kg on 4/24/86, in the soil and the Tech/GTRC documents attribute it to the reactor, but NOTHING is said on that fact in the GA. Rad. surveillance report bookfor 85-87. or printouts

Co-60 is a man made activation product produced as a result of the violence of the chain reaction. It's a beta and gamma emitter. Safe Drinking water Act allows a maximum of 100 pci/l which is actually outrageous - New EPA regs may change this, anyway, Tech levels in water to sewers which becomes everyone elses drinking water downstream, reached 520 pci/l 5/22/91 EPA's federal so-called "allowable" limit (allowable to them, but not to anyone in their right mind) for BETA in water is 50 pci/l so Techs BETA in water ranges from 1,950 pcil to to 1,ioo pci/l in 1991 to 800 pci/l 3/4/92.

Before I get to contamination of people as a result of this dump and deaths due to what has gone on, I wish to state that Dr. Bertell was sent a great deal of documentation on this mess, She is, as you know an expert on the effects of low levels of radiation and is not affiliated with any government or military that can influence her work.

Without knowing that there was transport of radioactive sources (unescorted I may add according to Dr. Ice) across the campus, she did an analysis pinpointing exactly how they would be transported, she also did an estimate based on what we thought at the time was an accurate inventory of the co-6o, but in fact it is higher. The analysis was for the catastrophic effects of dispersal/exposure to co-6o in the pool and it was terrifying. As one has to go out of state to get anyone to make a proper judgement on the effect of the co-6o, I would tell you what two Radiation Safety Officers in other States with great experience in this matter have said, given a scenario of an attack or similar on this pool resulting in the cobalt-60 being dispersed into the environment Kirk Whatley, Director of the Division of Radiation COntrol, Alabama Department of Public Health, "It would be a very serious problem, no one could dispute it, in my opinion anyone would agree to that " (My phone conversation with him March 14th 1996) + summit Pat Young

Larry Addis in a phone interview with German Journalist Irene Hell + us, I heard a recording of, said dispersal outside would be "catastrophic stabilization, cleanup, personell exposure would be catastrophic"

The bottom line is one would have to immediately evacuate about a half mile radius. Any particle sized pieces that got into the water or sewer system would have to retrieved. Mr. Addis who I quoted earlier is the Radiation Health specialist at Clemson University who has managed 250 radiation safety people and has vast experience. I do not want to hear that any of these people are interferred with or demoted. There seems to be a history in the nuclear industry of ruining peoples lives if they speak out. Even Dr. Karam agreed April 18th that cobalt doesn't disolve in water . It would be really nice if NRC Region II could stop trying to convince me it's soluble .

I also want to enter a recent letter to me from Dr. Bertell in

The Ra-226 levels in soil AT TECH are also frequently very high with 2 tests reported higher than 1500 pci/kg. .EPA set a high cleanup level based on the worst contaminated u-mill tailing sites, NY Dept. of Labour prohibits disposal higher than 0.1pci/g (100 pci/kg) (NRC Decommissioning Studies Jan. '93 p.5-2) Be-7 levels are very high should be more or less constant levels (not) according to SRS* and also come from nuclear ops. acc. to GA. POWER

SRS* = [redacted] ENVIRONMENTAL SAMPLING UNIT

in which she says quote: "Thank you for forwarding more information on the very risky Atlanta housing situation for the Olympic Athletes, I cannot understand the recklessness of this choice, or of the continued housing of students so close to the nuclear reactor and cobalt -60 storage." She then goes on to tell me about the International Atomic Energy Agency's attempts to cover up Chernobyl disaster and mentions that these so-called radiation "protection" experts find all the suffering of the children and the liquidators at Chernobyl Is quote "recoverable and therefore not a detriment" She concludes with the observation that quote" It may take up to many more years to finally bring the nuclear industry into line with occupational and public health standards for other hazards, but it will have to come. This will undoubtably force the closure of such polluting installations as that at Georgia Tech. Please know that I support your efforts to close down this facility and have the Cobalt-60 removed prior to the Olympic Games this summer. A terrorist attack would produce a disaster worse than Chernobyl and the prime victims would be our finest young athletes. I believe that we have established credible documents that provided timely warning to the Olympic organizers of the danger. They will have to answere to severe international condemnation if the worst happens. However, they may also be found responsible for direct damage to athletes exposed even in the best case scenario."

By the way, Dr. Bertell agrees with me that the campus is severely contaminated.

Now we get to contamination of people : attached documents, (FROM EPD FILES) one of which has the first page missing show that workers have been seriously contaminated. Mr. Lupton, Mr. Pemberton, an unamed person, and in another incident a Mr. Shannon (WHO REPORTEDLY (BOYD) LATER SUED), the documents from EPD files are attached. The first incident shows then NNRC director Dr. Russell was told, also Mr. Carter. There remains a serious question noted in the documents if federal people were told. State obviously was as it was in their files. I spoke to Mr. Lupton (April 9th'96) He said when incidents occur they do an hour and a half of washing before the State gets there and it should be changed. He suffers many skin cancers. His first wife died of breast cancer and had no X-rays in her life (of the breast prior to diagnosis. It is possible contamination tracked home could have had something to do with it. We shall never know. He also said there had been someone who taught at Tech a brilliant graduate student working with radiation called Joe de Lavalle (? spelling) who"took a lot of radiation and was dead in two days." His wife had worked at the library, I tried to locate her, but she is dead. He also worked with Yttrium-90. They worked with Sr-90 too at the area NRC licenses. They manufactured Yttrium microspheres to be implanted in patients. .Acc. to State files, (Sept. 6, 80) Dr. Mantravadi of the University of Ill. got them and implanted them in a patient. then saw unexpected radiation levels around the patient. He went nuts, his patient and others died, word had to go out to wherever they had been sent. 50% had leaked from the microspheres. Mr. Lupton told me that " it was done by a graduate student who didn't know what he was doing". Which sort of makes my point about students involved in dangerous work.

As The ORIGINAL 1960 Safety report shows that They put this entire reactor a hot cell, pool and lab in the middle of peoples homes, the nearest being 200 feet and within 400 yds and 600 yds of Home Park School

O'Keefe respectively and within about 300 to 500 yards of the Calloway apartments which houses 156 families of students and faculty and and many small businesses equally close, I did some tracking, which was almost impossible. However, I tracked the former owner of Southern Oxygen SUpply which was at 801 State St. about 330 yards to the south /se of the reactor ,hot cell and strontium 90 glove box /ytrium 90 location. the owner had had no idea what it really was, or what was done there at the time (not surprising as, a) on the original liscence only three people got a copy one being then Governor Carl Sanders, and b) opportunity for comment was published in the federal ègister in Washington that most people, specially back then, had never even heard of, or wouldn't know how to get, The owner told me (April 15th'96) it was a small business less than 10 people. He himself had had heart problems and a stroke (which Dr. Gofmans many papers have linked to radiation) His wife who visited often had many operations on her thyroid. The co-owner died age 50 in the seventies after much suffering from bone cancer a cause of which is Strontium-90 which if inhaled or ingested seeks out bone (see the BEIR report and Dr. Helen Caldicotts works) such as "Nuclear Madness, What you can do" published 1978)but what upset him the most was the bone cancer of an employee he had first hired at the age of 18 who died about 1980. He said by the time he died his bones had so deteriorated he had lost about eight inches in hight too. He said he would just let him come and sit at work and try and do odd things at first, he said quote" He was one of the sweetest, nicest people, It was tragic.He'd be just a-sittin' there tears comin' out of his eyes he hurt so bad" at this point the former owner, Mr. Smith, himself began to cry. So, of less THAN 10 EMPLOYEES and he told me the few female employees did not discuss their health problems with him - you have two bone cancers,thyroid ops, stroke and heart problems . A former, highly controversial Governor of Georgia, Lester Maddox, had a restaurant about 370 yards from the reactor complex. His rare cancer and struggle with it was highly publicised down here due to his notoriety.
I could go on, the student in the frat housing nearby who recently was getting over non-Hodgkins lymphoma. The TLD badge on the side of the Frat. house?no one told them what is was for. No one had told them what to do in an emergency. The dead birds and animals that were not road kill in that area of the campus (Janet had told me of that also years ago) I could go on for days, EXAMPLES

The twelve places on campus with fixed radioactive contamination including room 167 in the NNRC that had SR-90 contamination on the floor and they put epoxy over the contamination and a new floor down and stuffed waste in the basement.
The cesium-137 separation being done in the shack out back venting benzene, a known carcinogen too (Mr. Collins and NSC Minutes)
The leaking tritium container being stored in the hoods of a lab in 1993 that contaminated the lab and although it was meant to be sealed someone came in and stole a tritium pump.
The contamination in the cobalt-60 pool.the failure of alarms at the hot cell doorsx, the having to hand-crank each cobalt source up into the hot cell that can take five minutes (Mr. Boyd) .
Dr. Mahaffeys report (Feb. 19th 87 Radiation protection COmmittee minutes) of the failure of equipment in the reactor control room causing the reactor power level to rise undetected by the operator

The radiim needle the notorious "Union Miniere" of Belgium certified — that same Union Miniere that has helped rape what used to be called the Belgian Congo to help provide uranium for the US Nuclear bombs - and how it got lost, and how Bob Boyd found it after hours of searching under a pile of LEAVES . The fact that Boyd , and Wright , at a meeting in the early seventies , when asked by Dr. Spooner if they should approve the co-60 coming in told the University NO, Some of the stuff came from the Lockheed site Lockheed contaminated and should clean up, it's on the banks of the Etowah River. Mr. Boyd did the best he could with a program that was often very difficult, and the documents show that no one wanted to spend the needed money on upgrading and safety,

A couple of years ago, Mr. Blackman, the EPD Technical support person over at Techs labs, told me the State was going to put air monitoring samplers around that dump of a reactor facility. -I'd been asking for them. on April 17th he told me it was not put in place like I had asked for and added " I'm not going to deny it's not a reasonable thing to do". He told me they don't go up onto the roof of the building (i.e. to monitor the plenum the hot cells and glove box that NRC licenses under the original license) He said their health physics (Techs) program is responsible for on campus monitoring. I had called (April 1st) the reactor and asked the health physics technicians Mr. Bassett had told me climb the stack to monitor it - even though one of his reports said they were not doing it. I spoke to Mr. Jawdeh and asked how often they read for contamination and how often the filters were changed from the hot cell areas and the fume hoods, and he got very confused and told me to speak to Dr. Ice who told me the filters were usually just contaminated with "dust and dirt" which I find highly improbable, and he did not seem to understand how the air flow goes at all from the hot cells and asking what reference I had, I said the drawings or documents or something like that. He said they didn't check up on the roof, He also said they don't sample for tritium. He told me samples were taken when the fuel rods were cut, but there wasn't any monitoring done up on the roof. I had told him there was meant to be a TLD etc in the plenum on the roof and it was meant to be monitored for tritium up there. He was a bit confused and had said that when the TLD's were changed out they would include the one on the roof, but seemed unsure. I asked when they'd be read, and he said quote "the badge that read for the FUEL EXCHANGE was read this week". I found the words "fuel exchange very interesting, as you had ordered no fuel to come in before the Olympics, etc. . Mr. Collins told me about early March, that some of the fuel there was not irradiated (i.e. it was fresh fuel) and that it had been left there. If so, it must be HEU. I thought all the HEU , all the fuel, period, fresh and irradiated spent fuel was meant to be out prior to the Olympics. I also urge you to pay special attention to the damning inspection done by Mr. Hills staff because it shows his division has serious concerns over the way things are run, and the State license is up for renewal in a few days. Mr. Hill is in a difficul position, he can only go by the truly awful State laws and he has to rely on what Tech tells his division , except when his staff do their inspections, and even then , given Techs track record, what can be relied on ?

Feb. 29th 1996 NRC issued a notice on the spent fuel shipment from Tec

which says the unirradiated fuel was shipped out. Mr. Collins said it was left. . NRC Inspection Report 50-160/96-01 is very interesting, , not just because the people were given no formally documented training prior to the event and a fuel element was left in the hot cell overnight instead of being put back in the pool after the saw blade broke (to vent out the plenum all night). and that another waste tank must have developed a leak as it was also patched - but it says nothing about unirradiated fuel being shipped out.
A Georgia Tech News advisory of March 1st,1996 says "The transfer removes all of the highly enriched uranium from the Georgia Tech Campus, and boasts that it was carried out by NAC International, one of the leading spent fuel transporters in the world. If I were Tech, I wouldn't boast about using a company the Gwinnet Co. business license division said had no business license, a legal requirement.

There is so much more, but the bottom line is this : the reason Tech was initially pleading that it would cause undue hardship, blah blah, for them to go back and produce all the files GANE requested or something to that effect, may have had something to do with the documents that show for years the place seems to have been run, — the entire program , everything about it, — like a medieval pig-pen. Mr. Boyd told me, that because every time they run it at over 1MW the containment fills up with Argon, ~~they even had to~~ and it leaks, they had to put a separate air conditioning system in so the reactor operator wouldn't have to breathe the Argon Actually, I just checked my notes, he said "the whole building fills up with radioactive Argon.."

I would urge you to read every single NRC inspection report from 1985 onwards, and you will be appalled. Although I have most copies, we don't have the money to copy them and you could get them from NRC. Tech is rich enough to pay for their own copies.

There is no real license, it expired in 1980. All they got was an amendment to a construction permit. NRC's own counsel told me it was not the same thing. In the revised SAR the lousy one that they submitted they said decommissioning would cost 10 million and wanted to get the Georgia taxpayers to pay for it. It will probably cost far more to cart every last bit of contaminated crud offsite. I believe , since private corporations etc. were also involved that Georgia taxpayers should not have to pay perhaps those who benefitted from the vast amount of military contracts done there should. , and all the companies and out of state people who have used it.

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

In Techs opposition to the GANE petition of Jan 25th,1995they do not appear to understand the effects of radiation, SEE the remark on page 7 that it is small. As you know, there can be a huge amount of radioactivity in a small quantity of waste for example with high deadly activity. It is not the size, it's what's there, what is released etc. I believe what is in my 2.206 makes a mockery of both Tech and the NRC's positions against GANE and my petion NRC even told me May 10th,9 95 , when the fuel rods were still in there, that it would not be over for the city if there was an attack on it, say by a mortar or worse. when I protested this and said it would also cause a massive fire and cobalt would be exposed etc. , ~~disagreed~~ NRC's Mr.

Mendonca disagreed, he said they'd analyzed it. I got so upset about this statement I called Mr. DiMiranda (this was before I was told I couldn't speak to him) I was crying, . Mr. DiMiranda seemed worried and said he'd look into it, to try and put it out of my mind. I said I couldn't, I dream about it. May 11th I called Mr. DiMiranda again and he said he had spoken to Mr. Mendonca and advised him to call me , and asked if he should try and get him for me. I said yes. No one called. Also on May 11th 95, I got hold of Dr. Wartell in biology at Tech (listed on the second iventory as using radioisotopes I believ) and tried to get him to do something about getting the Cesium -137 irradiator out from the biology building as it was a danger to the students. He said he had more things to worry about on a daily basis and it was not his pervue, that he would h ang up on me (i.e. if I didn't stop urging it) and anyway he had to go to a meeting. By July 20th when I called Nrc's Mr. Dimiranda to ask for the umteenth time for the sewers and lines at the reactor to be tested, Oscar said he'd been ordered to tell me to talk to Craig. So I called Craig Bassett and told him, also about the need to X-Ray the . Late July I had a huge conversation with Mr. Bassett who was insisting on NRC's position that the reactor was on solid rock. as he had indicated NRC was getting ready to send me some type of response to my 2.206 I told him they better read my letters and the 2.206 better not come back saying it was on solid rock. He said he'd E-mail Marvin Mendonca and tell Mr. Mallet who was the Division Director over this. I was getting so cross I told him he could tell Mr. Mallett , who Mr. Bassett had said also would not get/do the tests , that he could go tell Mallett to go put a zoot suit on and get down the sewers and test them himself. Arouond this time I spoke to Mr. Shapiro, a State Geologist, and told him how the reactor was on the Wahoo Creek formation and over the old creek drainage area on fill. and about the sinkhole. He said if the fill contained saprolite, or limestone might have washed out and also have caused the sinkhole problem, he said he thought a main problem would be from the old creek/drainage bed. I asked if NRC had contacted them, he said NRC had not spoken to him or his staff, and he doubted they would come to him. He did not know if they had spoken to his boss (McLemore I think) [redacted] also sent me ANOTHER GEOLOGIST

MR. FRIDELL ⇒ data showing very few Georgia counties had uranium bearing deposits at all of course, and that in Fulton Co. there was only one undisclosed location (and it probably wan't under the reactor !) By the way a favorite argument of the DNR/EPD is that the on campus levels are high due to the granite buildings.

a) their own measurements taken at Stone Mountain, one of the worlds biggest granite monoliths period, shows along the creek below the carving 14 uR/Hr, on top of it 18 uR/Hr. measured with a Ludlim survey meter (p171 ,1979/80 book report) across the state of the 25 other measurements done excluding Stone Mt., 16 were much lower with an average or around 8 uR/hr. (P.170-171)

b) from 1960 Report photos, you can see how little granite there was in the area, all trees and little houses and its on the Wahoo Creek formation. Mr. Boyd said he remembered that back then surveys showed very little, practically nothing. They had even done tests, that they must be recorded in early documents.

c) In endlosed documents you will see readings that are higher than 14uR/Hr, missing TLDs and all. There is no way that all the granite buildings on the Tech campus are equivalent to the mass of Stone Mountain.

There is a lengthy Saga concerning my trying to track down these early Dept. of Human Recources Records I won't go into now, but you can have my notes if you decide you want them (i.e. copies) With one state official getting very scared after making enquiries for me , very very disturbing, and involving movement of files contrary to state proceedures according to two people. I was also trying to check any early health exposures to radiation in those files.

I believe the Commission should take back control over the c0-6o sources at Tech. I believe there is ample evidence that very serious health and safety problems exist surrounding all the years of operation of this facility, that careful reading of inspection reports and my own experiences concerning Techs nuclear reactor program with State and with NRC show the problems run deep, and that the main reason for Tech wanting to keep the facility going, is major contracts, also with DOE and perhaps the military, and out of sheer greed a city could wind up being sacrificed.There is also basically no insurance of note to speak of and there is an indemnity agreement mentioned in the attached documents. When I asked Techs legal counsel Mr. Nordin and Mr. Freddy Everett of Techs Risk Assessment division March 4th 96 to tell me the amount of insurance carriesd on the reactor Everett was very uptight and angry and he did not want to tell me and neither did Nordin, refusing to look it up and saying one would have to go through the state open records ACT. I asked both Ken Clark, the PR man at NRC and NRc's Mr. Mendonca to send me information on the amount of insurance and indemnification. I have not recieved it. I realize I could have gone through the hassle of the Open Records Act, but, the bottom line is, as Tech stated in its Feb. 1st 1960 Application to the Atomic Energy Commission, enclosed, page 2, "As an Agency of the State of Georgia the Georgia Institute of Technology is legally immune from public liability ". But who really owns the reactor ? The most frequent answer I got from Tech Officials revolved around the Board of Regents. They are individuals. It doesn't really matter, no money in the world could compensate for the death of a city.

In the light of current medical/health standards and knowledge, I find it appalling that in order to try and get a renewed license the so-called Revised SAR submitted used standards set back in the 1950's. It's in SAR footnotes. The BEIR V Report goes into the details of effects of radiation at low doses, on everything from causing increases in all types of cancers, to serious genetic defects, mutations, damage to subsequent generations, effects on schblastic apptitude in children and so forth. Tech shows a complete disregard for the sanctity of life, for future generations and for environmental consequences by using documents of the type submitted in order to get relicensed. By todays medical and EPA standards this facility cannot be relicensed. This facility is in the heart of a major city. It is old,in an earthquake zone, one unsuitable soils, at the headwater regions of major rivers constantly exposing young people to its daily emissions under ALARA. It was not built to current safety

standards, , and it is doubtful Tech would have succeeded back in the s'xties in locating it where it is, had more people known, in particular those in the medical and environmental community, as we have known the effects of ionizing radiation for over 100 years. Both Madame Curie and her daughter died of its effects. Native Indigenous peoples have realized its effects without understanding what it was for centuries,. Avoiding areas that we later realized had uranium deposits in large quantities. (Australian Aborigines, certain Native American Nations).

I would like to say that I find it cruel and objectionable that NRC staff and Tech COuncil pushed to EXCLUDE MS. CARROLLS TESTIMONY. and, for the most part succeeded perhaps due to ~~constra~~ constrainsts of how the ASLB must interpret the existing laws.

Ms. Carroll may not be an "expert" in the sense of being a ~~radiological health physics~~ Tech scientist torturing animals to death by radiation in Techs underground maze called Crenshaws Mountain witn cobalt -60 to establish what we already know, namely that radiation kills, but she has more of a mental and in depth understanding of the consequences of the nuclear nightmare, and compassion for living things than the army of high priced lawyers ranged against her have. In their desire to win at all costs over the common good, they committed an act of mental cruelty against her by making sure she could not participate the way she had hoped. I urge you to fully explore everything she raised in writing — and in any of her statements-to the fullest.

I beg you to consider all letters I have sent under my 2.206 petion and this portion also, as well as all inspection reports and documents referred to and supplied. I believe there is overwhelming evidence to support my 2.206 contentions and Ms. Carrolls contentions. .

I therefore plead, that in the interests of the effects to future generations , and the current well being of the city and the state that you grant us a favorable judgement.

Dr. Bertell was shocked that exposure levels at this facility . Since 1980 NRC has recommended that ionizing radiation exposure to the general public from a local nuclear power or nuclear weapons complex not exceed 25 mrem year. Mr. Collins said nuclear research reactors got exempted. If that is true, it is indeed a disgrace. The office of Mr. Hardeman, if I remember correctly was recently sent a notification via Senator Glenn's committees ,again if I remember correctly, concerning the fact that Dawson Forest was contaminated. We discussed it, but I did not take notes. The need for cleanup was at issue. How much more then is the need for this campus, this reactor site to be cleaned up which is far more contaminated according to their own documents ?

NRC should abide by EPA standards at the least. And under those terms, this dump of a facility could not be relicensed.

In closing, I would quote from the last page of former executive director of the Union of Concerned Scientists book : Melt-down - the Secret Papers of the Atomic Energy Commission" which has a forward by former ASLB Judge Samuel Jensch, lamenting that had he known what Ford's ten years of research uncovered, a number of facilities would not have been built in this country. Ford's closing book statement says : " One can only hope that before the

next meltdown accident, the authorities will finally recognize that when one is at the edge of a precipice, the only progressive move is to step backward."

Everything about this facility shows we are at the edge of a precipice. I am aware, as Judge Bechhofer told me, that due to my detailing and raising the terrorism issue, and GANE raising it, the fuel rods were removed prior to the Olympics, and I thank you for understanding this grave concern. However, even absent the Olympics this facility poses the same threat in the heart of the city The LEU (Low Enriched Uranium) they wish to bring in afterwards to refuel it with is even higher in plutonium. The Emergency Planning Zone NRC allows around this reactor is only 300ft, beyond that, the students, the city itself can go to hell, which it will, in case of accident or terrorist attack. Please help us step back from the precipice , because if you don't, based on the evidence I have put before the COmmission these last two years, I believe one day a lot of people are going to look up and see the Angel of Death . Please, shut it down, forever.

Thank You,

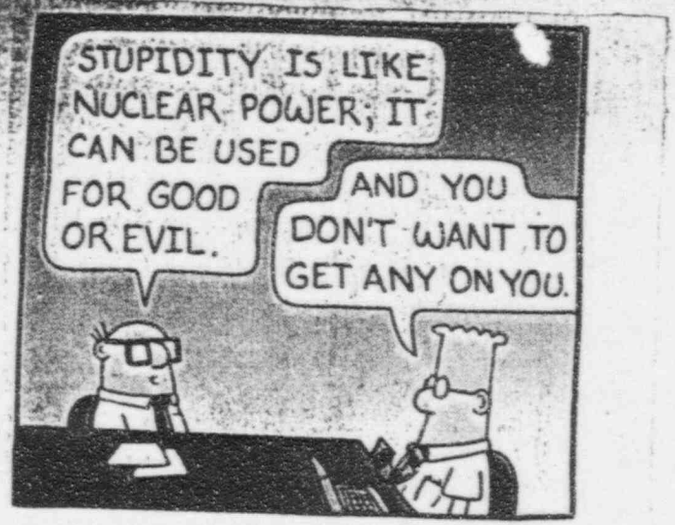
Pamela Blockey-O'Brien

Pamela Blockey-O'Brien.

PAMELA BLOCKEY-O'BRIEN
D23 Golden Valley, Douglasville, Georgia 30134 U.S.A.

Attached documents of approx. 500 pages.

FROM A "DILBERT" CARTOON STRIP, BY BY SCOTT ADAMS



AEC

BECOMES

N.R.C AND D.O.E.

STATE LEVEL IT'S CALLED THE GA. DEPT. OF NATURAL RESOURCES ENVIRONMENTAL PROTECTION DIVISION, RADIATION SURVEILLANCE DIVISION BOTH ARE FUNDED BY THEIR LICENSEES i.e. THE NUCLEAR INDUSTRY.

Rosalie Bertell, PhD, GNSH
710-264 Queens Quay West, Toronto ON M5J 1B5 Canada
Tel: 1-416-260-0575 / Fax: 1-416-260-3404
email: 103062.1200@compuserve.com

May 6, 1996

Pamela Blockey-O'Brien
D23 Golden Valley
Douglasville, Georgia 30134 USA

Dear Pamela,

Thank you for forwarding more information on the very risky Atlanta housing situation for the Olympic athletes. I cannot understand the recklessness of this choice, or of the continued housing of students so close to the nuclear reactor and cobalt 60 storage. I have been slow to respond to you because I have been in Europe for a month trying to deal with the International Atomic Energy Agency attempts to cover up the Chernobyl disaster. Their conference in Vienna ended without a consensus of the damage from the disaster, with the officials insisting that only 31 people died, and there were no other problems except for thyroid cancers, most of which were not fatal. The Ukrainian Minister of Health was maintaining that 125,000 had died and there were many children and adults suffering immune depression, stomach ailments, autoimmune diseases, congenital malformations and other problems.

Not only do the radiation "protection" experts consider 10,000 more cancer deaths than would be permitted to chemical polluters, acceptable to the public, but they find that all of the suffering over the past ten years of children and the liquidators at Chernobyl is "recoverable and therefore not a detriment". This is very strange thinking from an occupational or public health point of view. However, with such a strange concept, they encourage recklessness in exposing women, children and men to this hazard.

It may take us many more years to finally bring the nuclear industry into line with occupational and public health standards for other hazards, but it will have to come. This will undoubtedly force the closure of such polluting installations as that at Georgia Tech. Please know that I support your efforts to close down this facility and have the Cobalt removed prior to the Olympic games this summer. A terrorist attack would produce a disaster worse than Chernobyl, and the prime victims would be our finest young athletes. I believe that we have established credible documents that provided timely warning to the Olympic organizers of the danger. They will have to answer to severe international condemnation if the worst happens. However, they may also be found responsible for direct damage to athletes exposed even in the best case scenario.

Sincerely,

Rosalie Bertell

Scientific and Human Rights Consultant to the
International Institute of Concern for Public Health

Rosalie Bertell

NO IMMEDIATE DANGER

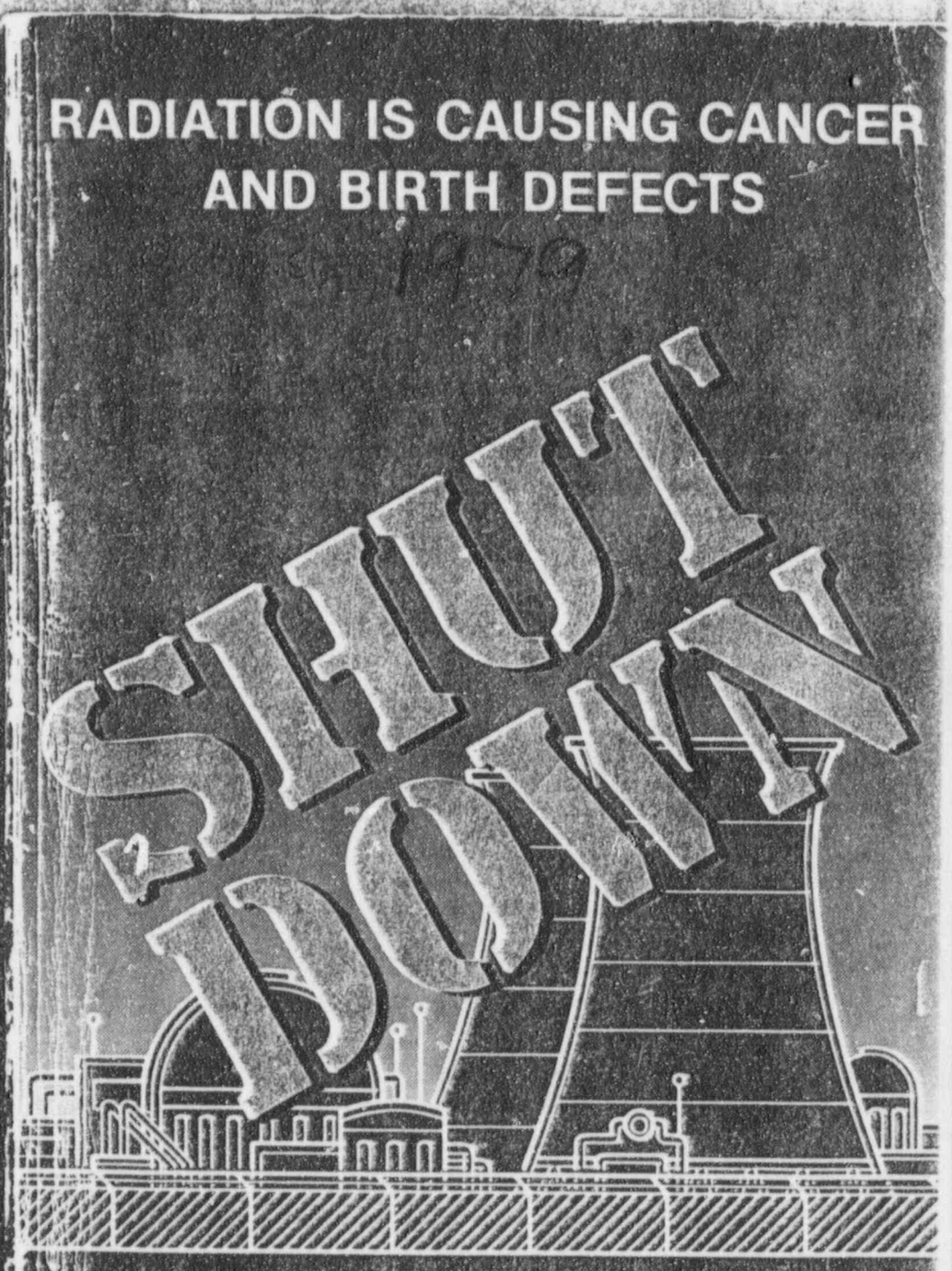
Prognosis for a Radioactive Earth

Probable Health Effects resulting from Exposure to Ionising Radiation

Dose in rems (whole body)	Health effects Immediate	Delayed
1,000 or more	Immediate death. 'Frying of the brain'.	None
600–1,000	Weakness, nausea, vomiting and diarrhoea followed by apparent improvement. After several days: fever, diarrhoea, blood discharge from the bowels, haemorrhage of the larynx, trachea, bronchi or lungs, vomiting of blood and blood in the urine.	Death in about 10 days. Autopsy shows destruction of hematopoietic tissues, including bone marrow, lymph nodes and spleen; swelling and degeneration of epithelial cells of the intestines, genital organs and endocrine glands.
250–600	Nausea, vomiting, diarrhoea, epilation (loss of hair), weakness, malaise, vomiting of blood, bloody discharge from the bowels or kidneys, nose bleeding, bleeding from gums and genitals, subcutaneous bleeding, fever, inflammation of the pharynx and stomach, and menstrual abnormalities. Marked destruction of bone marrow, lymph nodes and spleen causes decrease in blood cells especially granulocytes and thrombocytes.	Radiation-induced atrophy of the endocrine glands including the pituitary, thyroid and adrenal glands. From the third to fifth week after exposure, death is closely correlated with degree of leukocytopenia. More than 50% die in this time period. Survivors experience keloids, ophthalmological disorders, blood dyscrasis, malignant tumours, and psychoneurological disturbances.
150–250	Nausea and vomiting on the first day. Diarrhoea and probable skin burns. Apparent improvement for about two weeks thereafter. Foetal or embryonic death if pregnant.	Symptoms of malaise as indicated above. Persons in poor health prior to exposure, or those who develop a serious infection, may not survive. The healthy adult recovers to somewhat normal health in about three months. He or she may have permanent health damage, may develop cancer or benign tumours, and will probably have a shortened lifespan. Genetic and teratogenic effects.
50–150	Acute radiation sickness and burns are less severe than at the higher exposure dose. Spontaneous abortion or stillbirth.	Tissue damage effects are less severe. Reduction in lymphocytes and neutrophils leaves the individual temporarily very vulnerable to infection. There may be genetic damage to offspring, benign or malignant tumours, premature ageing and shortened lifespan. Genetic and teratogenic effects.
10–50	Most persons experience little or no immediate reaction. Sensitive individuals may experience radiation sickness.	Transient effects in lymphocytes and neutrophils. Premature ageing, genetic effects and some risk of tumours.
0–10	None	Premature ageing, mild mutations in offspring, some risk of excess tumours. Genetic and teratogenic effects.

RADIATION IS CAUSING CANCER
AND BIRTH DEFECTS

1979



NUCLEAR POWER ON TRIAL

EXPERTS TESTIFY IN FEDERAL COURT

LIFE-THREATENING EXPERIMENTATION on citizens without their consent, and willful causing of disease, death, and deformity within a large number of people over a long period of time are crimes against humanity.

It can never be maintained that sound public policy would permit government or non-government agencies to deprive human beings of their lives in order to obtain energy for other human beings.

"I have been with nuclear energy since before there was an Atomic Energy Commission and before there was a Manhattan Project. In fact, I was a member of the early team that did some work that led to the Manhattan Project."

"There is no reasonable doubt in my mind or to my knowledge from the scientific literature on the part of anyone that radiation is a cause of leukemia or cancer."

"There are more deaths now, and there will be more, the more that gets out of containment."

—John W. Gofman, M.D., Ph.D.
Co-discoverer of Uranium-233

"...the actual doses to the members of the population living near these plants are hundreds of times greater than the National Academy was told or than we had calculated in the earlier years of nuclear optimism."

"I do not rely upon projection. I do not rely upon any linear hypotheses or quadratic or superlinear hypotheses. We rely solely upon a comparison between a city which has suddenly had nuclear power operating in it...and afterwards, suddenly, for no other explainable reason that has yet been advanced by anyone in the industry or the Atomic Energy Commission, or the NRC, there was a sudden and unexplained rise in infant deaths, in leukemia, and many years later in various types of cancers."

—Ernest J. Sternglass, Ph.D.
Director of Radiological Physics
University of Pittsburgh

Murder Trial of the Century

$4.95

ISBN 0-913990-21-3

Introduction

The late Congressman Clifford Allen of Tennessee spent his last Thanksgiving Day composing a press release about the severe underestimates of radiation released into the biosphere from the nuclear fuel cycle. He had just received some alarming information, a copy of the memo written by Dr. Walter Jordan, a member of the Atomic Safety and Licensing Board and a former Assistant Director of Oak Ridge National Laboratories. In 1977, in what has come to be known as the "Jordan Memorandum," Dr. Jordan disclosed that the estimates of the releases of radon gas from the nuclear fuel cycle had been 100,000 times too low. Dr. Jordan's figures showed that as many as one hundred deaths could eventually result *from each day* that the nuclear power industry continued in operation.

With Congressman Allen as he composed his press release was Jeannine Honicker, a Nashville businesswoman. Jeannine's daughter, Linda, had contracted leukemia at age nineteen, but recovered after a difficult and complicated bone marrow transplant. Jeannine's husband, Dolph, News Editor for the Nashville *Tennessean*, had written Linda's story for the *Reader's Digest*.

In the process of learning about leukemia, Jeannine discovered something else. Leukemia is one disease which has been shown to be caused by radiation. According to health physicists, a doubling of the spontaneous rate of leukemias might be part of the price we would pay if we used nuclear-generated electricity. Jeannine was among more than thirty intervenors in the licensing process for the world's largest nuclear plant at Hartsville, Tennessee. Joining with nuclear opponents in ten southern states, she helped to found Catfish Alliance. Following Clifford Allen's death, she ran for his seat in Congress, unsuccessfully.

In early 1977 Jeannine met Stephen Gaskin, founder of The Farm, a religious community in Summertown, Tennessee, and Albert Bates, a paralegal associated with Farm Legal. They agreed to help prepare a case against the Nuclear Regulatory Commission.

Biography of John W. Gofman, M.D., Ph.D.

Education

A.B. Chemistry, Oberlin College, 1939
Ph.D. Nuclear Chemistry, Univ. of Calif., Berkeley, 1943
M.D., School of Medicine, Univ. of Calif., San Francisco, 1946
Internship in Internal Med., Univ. of Calif. Hosp., San Francisco, 1946-47

Positions

Academic appointment, Div. of Medical Physics, Dept. of Physics, U.C. Berkeley, 1947; advancement to Full Professor, 1954; Emeritus, 1973.
Concurrent appointment (1947 on), Instructor or Lecturer in Medicine, Dept. of Medicine, Univ. of Calif., San Francisco.
Medical Director, Lawrence Livermore Laboratory, 1954-1957; Associate Director, 1963-1969.
Founder and First Director, Biomedical Research Division, Lawrence Livermore Laboratory, 1963-1965.
Chairman, Committee for Nuclear Responsibility (current).

Honors and Awards

Gold-Headed Cane Award, 1946, to graduating senior for qualities as a physician, U.C. Medical School
Modern Medicine Award, 1954, for outstanding contributions to heart disease research
Lyman Duff Lectureship Award (Amer. Heart Assoc.), for research in atherosclerosis and coronary heart disease
Stouffer Prize, 1972, for outstanding research contributions in arteriosclerosis
One of the 25 Leading Cardiologist Researchers of the Past Quarter-Century, American College of Cardiology, 1974

Patents

- Discovery of Fissionability of Uranium-233
- Two Processes for Isolation of Plutonium

Books Published

What We Do Know About Heart Attacks
Dietary Prevention and Treatment of Heart Disease (with A.V. Nichols and V. Dobbin)
Coronary Heart Disease
Population Control through Nuclear Pollution (with A. Tamplin)
Poisoned Power: The Case Against Nuclear Power (with A. Tamplin)

Other Publications

Approximately 150 scientific articles encompassing the following fields:

- Lipoproteins, atherosclerosis, coronary heart disease
- Trace elements by X-ray spectroscopy
- Chromosomes and cancer
- Medical effects of ionizing radiation
- Nuclear power, the hazards of plutonium and other sources of ionizing radiation

BY THE COURT: Those rules provide that you will give a summary of all of this background information and ask one question and ask the witness if that's correct. Do you have all that information that you can recite?

BY MR. KACHINSKY: Yes, I do, and Exhibit No. 5 is a biographical sketch.

BY THE COURT: Let Exhibit No. 5 be filed as an exhibit and go on to a pertinent question then. Let Exhibit No. 5—do you have it over there? Let it be filed. I will read that. You don't have to go into that. Exhibit No. 5 is a vitae, *all right.*

[*Marked and filed Exhibit No. 5 in evidence*]

BY THE COURT: Go ahead, sir.

BY MR. KACHINSKY: [*Continuing*]

Q. ***Okay, as a result of your education and experience in relevant areas, do you feel qualified to answer questions on radiation physics and biology?***

A. Yes, Sir.

Q. ***Could you tell us briefly what is radiation?***

A. Radiation is one form of energy. We have radiation ranging in wave length all the way from very long wave length to very short wave length, and the types of radiation we are concerned about here are those of very short wave length in the form of X-rays and gamma rays; and in addition these can be generated by machines, for example, X-ray generators, or they can come from natural and man-made substances.

In addition to that form of radiation, we have particles that can be emitted by radioactive substances, such as electrons, which we call either beta rays or positrons.

We have alpha particles which are charged nuclei of helium.

These are all forms of radiation; either waves in nature or particles. Actually the waves are also regarded as particulate for some purposes.

Q. ***Okay. How does radiation affect living organisms?***

A. In general, ionizing radiation affects living organisms in a destructive manner. It causes, as it goes through the cells of living organisms, the ripping away of electrons from the molecules or atoms in which they are present and thus altering those atoms and molecules to some other form.

In addition to ripping away electrons from atoms and molecules, it can often displace electrons from one energy state in the molecule to another. All of these have the effect of altering the naturally occurring substances in a biological organism.

are too low, and Dr. Radford, the current chairman of the BEIR Committee in testimony before the Congress in February has stated that the BEIR Committee is going to raise their estimates, because the hazard now appears to be worse than he thought, which is in the right direction.

And we understand that there will be a report from the BEIR Committee this fall sometime revising their previous estimates.

Q. ***Could you tell us what ALARA, A-L-A-R-A, refers to?***

A. ALARA, A-L-A-R-A means as low as reasonably achievable. It has nothing to do with safety or freedom from cancer and genetic injury. It just means that for the amount of money you are willing to spend, try to do what you can to keep people from getting too much of a dose and hence too many cancers and leukemias and genetic injuries.

Q. ***Does ALARA essentially plan in human deaths?***

A. So long as you have.....

BY THE COURT: What is that again?

BY MR. KACHINSKY [*continuing*]

Q. ***Does ALARA plan in, is it included?***

BY THE COURT: No, the second word?

BY MR. KACHINSKY: ALARA.....

BY THE COURT: No, the word after that.

BY MR. KACHINSKY: Plan, p-l-a-n, plan.

BY THE COURT: All right.

A. Plan in human deaths?

BY MR. KACHINSKY: [Continuing]

Q. ***What—does ALARA.....***

A. It permits deaths.

Q. ***Permits human deaths?***

A. Yes, because ALARA does not say—see, the only way you could avoid deaths from the nuclear fuel cycle is to have zero releases.

ALARA says keep the releases as low as you can reasonably achieve with the economics that you want to spend on it and the equipment you have available and so forth.

So it is a planned emission of radioactivity and that in effect means planned deaths.

Q. ***What is a lifelong plateau?***

A. The effect of radiation in producing cancer is that for a period and after the person is exposed—he's injured the moment he's exposed; that's when the genes and chromosomes are hurt; that's an irreversible injury.

But then at some time later, as I indicated before, you begin to be able to perceive an excess of cancer.

Now, in the human, the studies that have been going have not been going long enough so that we know for sure whether once you start seeing, say, a thirty per cent increase in cancer per year, whether it will last for twenty years or thirty years or for the whole rest of the life of the persons exposed. We call this region where the number of cases of cancer deaths each year caused by the radiation, where that number stays fairly constant, we call that a plateau region.

And the question asked in your question about a lifelong plateau is the radiation effect continued throughout the rest of the life or do you go back to the normal risk after thirty years or so?

Everyone in the radiation community of protection knows that we don't know the answer, and the only reasonable prudent public health posture is to assume a lifelong plateau unless you have proved that it isn't lifelong.

But the number of cancer deaths is much higher if the plateau lasts for the lifetime than if it only lasts for twenty or thirty years.

Q. ***What was the Tri-State Leukemia Study?***

A. That was a study of the association of such diseases as leukemia with the amount of X-rays that have been received by people in their past

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

SEP 11 1978

Dr. John W. Gofman
Committee for Nuclear
Responsibility, Inc.
P. O. Box 11207
San Francisco, California 94101

Dear Dr. Gofman:

Thank you for sending us a copy of the article from the newspaper, The Day, from June 30. We were not aware of this article and appreciate your calling it to our attention.

The interview with us on which the article was based was some time ago. We have recently gone to the Commission with a staff paper on the topic of occupational exposure, and think you will find this staff paper a current and much more detailed picture of our views. A copy is enclosed.

Your letter questioned the context of the quotations in the article. The interview covered the broad scope of occupational exposure to ionizing radiation, only part of which is in facilities or activities licensed by NRC. There was particular emphasis on occupational exposures in the inspection, maintenance and modification of nuclear power plants and in the practice of nuclear medicine. Presumably because of limitations of space, and in recognition of the particular interests of local readers, the article deals mostly with exposure of workers at power reactors and thus applies the quotations in a somewhat narrower context than the interview. However, we feel that the authors have made a fair and generally successful effort to present the main thrust of what we said. Although much of the material in quotation marks is in fact a summary of a rather long discussion, we don't feel that what was said is misrepresented, recognizing that a writer must have some latitude in reducing a long interview to an article of reasonable length.

There are a few points in the article that we would like to comment on.

(1) The most serious flaw in the article is that it does not seem to properly catch the extent of our concern with the growth in total worker exposure, that is the collective dose, as compared to the exposure of individuals where the picture is generally better. Also, in discussing the growth in the collective dose, we are sure that we discussed this as being of concern not just because of genetic effects as the article says, but also somatic effects.

(2) The article comments on planned proposals to the Commission. You can refer to the staff paper for the specifics of what we proposed to the Commission. One point we discussed was the importance of an informed decision by radiation workers to accept exposure, and this is undoubtedly the basis for the somewhat paraphrased quote attributed to Goller. The evidence mounts that, within the range of exposure levels encountered by radiation workers, there is no threshold, i.e., a level which can be assumed as safe in an absolute sense. We have found in discussions with people both in the power industry and in the nuclear medicine field that many people in these fields honestly believe that the low levels of exposure permitted are without risk, which reflects that somehow the wrong message has been delivered, in spite of the fact that our regulatory program has been based on the prudent policy assumption that any amount of radiation has a finite probability of inducing a health effect, e.g., cancer. We brought out in the interview our concern that in the past the way the regulations were written and regulatory programs were established may be responsible for creating the impression among many workers that the levels of exposure permitted are completely without risk. We felt that it should be made clear to workers that there is some risk. The third explicit point in the article is just one way of doing that.

(3) We discussed with the reporter two epidemiological studies started by the AEC, one being the Health and Mortality Study, of which the Hanford study was part, and the other the Transuranium Registry. The article somehow seems to confuse and lump these together.

(4) The quoted remarks about the problems of ingested or inhaled activity were not so much in the context of industry, but rather exposure of personnel during the atmospheric bomb testing program, a subject with which we believe you are much more familiar than we. As regards the regulated industry, our comment was to the effect that the very high level of uncertainty with respect to both "body burden" and neutron exposure had been recognized early and a number of effective measures taken to keep this type of exposure to extremely low levels. We did say that this area needed more attention and in particular needed to be taken into account in expanded epidemiological programs since much of the weapons test exposure has involved inhalation or ingestion. We have been told that the total number of people exposed in the weapons program over the years is quite large.

We could discuss a few other points, but think it would be basically just nit-picking. The article is fundamentally a good job of reporting on a complex subject and seems to us to reflect an effort to improve public understanding of some of the tough issues that have to be faced in dealing with nonthreshold pollutants; we think there is a growing awareness that radiation is only one of these. This certainly is an area which needs public attention and greater awareness of the difficult public health judgments that must be made in balancing the needs of society against the adverse impact of activities taken to meet those needs.

Sincerely,

Robert B. Minogue

Robert B. Minogue, Director
Office of Standards Development

Karl R. Goller

Karl R. Goller
Office of Standards Development

Enclosure:
SECY-78-415

cc: Mr. Lance Johnson
The New London Day
47 Eugene O'Neal Drive
New London, Connecticut 06320

A. I believe the standards now in effect, the permitted doses would permit people to die, yes.

Q. *What standards, in your view, would not permit people to die with regard to releases from the nuclear fuel cycle?*

A. Zero release.

Q. *Zero radiation. And that is the only standard . . .*

A. That would keep people from dying, yes, sir.

Q. *In your view, is there anything, any activity, that can justify releasing radiation to the general environment where people may be exposed to it?*

A. I think that that is a very fundamental question for society.

The Constitution tells me that it's not permitted to do something that takes life away without due process, and releasing radiation does that.

So, I can't justify a way if it justifies releasing radiation and killing people unless we change the Constitution.

Q. *Is it your testimony that no dose however small, as long as it is not zero—the*

HEALTH EFFECTS OF EXPOSURE TO LOW LEVELS OF IONIZING RADIATION

BEIR V

NATIONAL RESEARCH COUNCIL

HEALTH EFFECTS OF EXPOSURE TO LOW LEVELS OF IONIZING RADIATION: BEIR V

This volume reevaluates the health risks of ionizing radiation in light of new, much more reliable dose estimates for the A-bomb survivors and 11 more years of follow-up of the survivors for cancer mortality, follow-up studies of persons irradiated for medical purposes, and relevant experiments with laboratory animals and cultured cells. The committee presents risk estimates for specific organs in relation to dose and time after exposure, and compares radiation effects between Japanese and Western populations. They apply their risk estimates to the 1980 U.S. population to project the risk of cancer mortality at low levels of continuous exposure and for acute exposures, and give confidence intervals for these results.

BEIR V also examines heritable effects due to parental exposure and the effects of irradiation on the developing fetus; presents risk estimates for heritable effects, which are based primarily on studies with laboratory animals; discusses the role of somatic mutations in the development of radiogenic cancer; and examines studies of those exposed *in utero* at Hiroshima and Nagasaki, which show significant effects on brain development and intelligence.

Also of interest . . .

HEALTH EFFECTS OF RADON AND OTHER INTERNALLY DEPOSITED ALPHA-EMITTERS: BEIR IV

BEIR IV describes hazards from radon progeny and other alpha-emitters that humans may inhale or ingest from their environment. The authors analyze and summarize clinical and epidemiological evidence, the results of animal studies, research on alpha-particle damage at the cellular level, metabolic pathways for internal alpha-emitters, dosimetry and microdosimetry of radionuclides deposited in specific tissues, and the chemical toxicity of some low specific activity alpha-emitters. Techniques for estimating the risks to humans posed by radon and other internally deposited alpha-emitters are offered, along with a discussion of formulas, models, methods, and the level of uncertainty inherent in the risk estimates.

ISBN 0-309-03789-1; 1988, 624 pages, 6 x 9, index, paperbound
ISBN 0-309-03797-2; hardbound

NATIONAL ACADEMY PRESS
The National Academy Press was created by the National Academy of Sciences to publish the reports issued by the Academy and by the National Academy of Engineering, the Institute of Medicine, and the National Research Council, all operating under the charter granted to the National Academy of Sciences by the Congress of the United States.

ISBN 0-309-03995-9
90000
9 780309 039956

filled with tissue-equivalent gas at pressure levels appropriate for simulating spheres of tissue with diameters on the order of 1 μm. The principles of microdosimetry are extensively discussed in the BEIR IV report (NRC88) and ICRU report 36 (ICRU83).

Energy Transfer—Kerma and Absorbed Dose

The transfer of energy from photons to tissue takes place in two stages: (1) the interaction of the photon with an atom, causing an electron to be set in motion, and then (2) the subsequent absorption by the medium of kinetic energy from the high energy electron through excitation and ionization.

The first stage can be identified with the quantity called *kerma*, *K*, which stands for *k*inetic *e*nergy *r*eleased in the *ma*terial.

$K = dE_{tr}/dm$, where dE_{tr} is the kinetic energy transferred from photons to electrons in a volume element of mass dm.

The second stage, energy absorption, is more important for understanding radiobiological effects. The absorbed *dose*, the energy absorbed per unit mass, differs from kerma in that the dose may be smaller due to lack of charged particle equilibrium, *bremsstrahlung* escaping from the medium, etc. Another difference is that the kerma refers to energy transfer at a point, whereas the energy is absorbed over a distance equal to the electron range. Of the two quantities, absorbed dose is the easier one to approach experimentally and can be determined by a number of well-defined techniques, including gas ionization methods, calorimetry, and thermoluminescent techniques. On the other hand, kerma is often more easily calculated.

Radiation Chemical Effects Following Energy Absorption

After the electron produced by a photon interaction passes through tissue, exciting and ionizing atoms and molecules, a number of important chemical events that precede the biological effects take place. Most of the energy absorption takes place in water, since cells are made up of more then 70% water. When an ionizing particle passes through a water molecule, it may ionize it to yield an ionized water molecule, H_2O^+, and an electron by the reaction:

$$H_2O \xrightarrow{\text{radiation}} H_2O^+ + e-.$$

The electron can be trapped, polarizing water molecules to produce the so-called hydrated electron, e_{aq}. On the other hand, the ionized water molecule, H_2O^+, reacts at the first collision with another water molecule to produce an hydroxyl radical, $OH^\bullet$ according to the reaction:

$$H_2O^+ + H_2O \rightarrow OH^\bullet + H_3O^+$$

The free radical $OH^\bullet$ has an unpaired electron and is therefore highly reactive as it seeks to pair its electron to reach stability. At the high initial concentrations, certain back reactions occur producing hydrogen molecules, hydrogen peroxide and water. The initial species produced in water radiolysis can then be written as:

$$H_2O \xrightarrow{\text{radiation}} e_{aq}, H^\bullet, H_2O_2, H_2.$$

Instead of being ionized, the water molecule may simply be excited according to the reaction:

$$H_2O \xrightarrow{\text{radiation}} H_2O^*.$$

where H_2O^* is the excited molecule. But H_2O^* soon breaks up into the $H^\bullet$ radical and the $OH^\bullet$ radical according to:

$$H_2O^* \rightarrow H^\bullet + OH^\bullet.$$

As a result of the above processes, three important reactive species are produced: the aqueous electron, $OH^\bullet$, and $H^\bullet$, with initial relative yields of about 45%, 45%, and 10%, respectively. These reactive species attack molecules in the cell leading to the production of biological damage. The $OH^\bullet$ radical is believed to be the most effective of the three species in causing damage. Because it is an oxidizing agent, it can abstract a hydrogen atom from the deoxyribose moiety of DNA, for example, yielding a highly reactive site on DNA in the form of a DNA radical. Since this process arises from the irradiation of a water molecule rather than the DNA itself, the process is known as the *indirect effect*. Electrons set in motion by photons can, of course, directly excite or ionize cell macromolecules by direct interaction with the critical molecule. This is called the *direct effect*. Both mechanisms can produce cellular damage. There is strong evidence that the DNA is the most critical site for lethal damage, but other sites such as the nuclear membrane or the DNA-membrane complex may also be important.

Ward (Wa88) has derived an approximation of the damage yields expected in various moieties of DNA within an irradiated cell, in which consideration is given to the direct deposition of energy in DNA and other molecules. Table 1-1 shows the amount of energy deposited per Gray in each moiety of DNA within a cell that is assumed to contain 6 pg of DNA.

TABLE 1-1 Amount of Energy Deposited in DNA per Cell per Gray

Constituent	Mass per Cell (pg)	eV Deposited	Number of 60-eV Events
Deoxyribose	2.3	14,000	235
Bases	2.4	14,700	245
Phosphate	1.2	7,300	120
Bound water	3.1	19,000	315
Inner hydration	4.2	25,000	415

SOURCE: J. F. Ward, C. L. Limoli, P. Calabro-Jones, and J. W. Evans (Wa88).

Calculated from this is the number of events since 60 eV is the average amount of energy deposited per event.

The yields of DNA damage necessary to kill 63% of mammalian cells (63% of cells killed means that, on average, each cell has sustained one lethal event) can be assessed for various lethal agents (Wa88), as shown in Table 1-2. The high efficiency with which ionizing radiation (and bleomycin) kill cells is not simply due to individual OH radical-induced lesions, as witnessed by the large-scale production of single-strand breaks with hydrogen peroxide. Ward et al. (WA87) suggest that the efficiency of cell killing by ionizing radiation at relatively low levels of DNA damage is due to the production of damage in more than one moiety in a localized region, i.e., lesions resulting from multiply damaged sites in a single location or locally multiply damaged sites (LMDS).

Recent studies (Wi85, Gr85, Ei81), as analyzed by Ward (Wa88), support the importance of indirect effects of ionizing radiation in producing damage to intracellular DNA. This is of particular significance in view of the suggestion that most intracellular DNA damage is caused by direct ionization and that radicals produced in water cannot access the macromolecule. It appears from the above analysis (Wa88) that the volume of water in the DNA-histone complex (nucleosome) is at least equal to the DNA volume and that radiation-produced OH radicals in the water volume have ready access to the DNA molecule.

Some of the current assessments of DNA damage caused by ionizing radiation in mammalian cells (Wa88) are as follows: (1) direct and indirect effects are both important; (2) the quantity of damage produced by ionizing radiation is orders of magnitude lower than for most other agents for equal cell-killing efficiency; (3) individual damage moieties are not biologically significant since they can be repaired readily by using the undamaged DNA strand as a template; (4) LMDS are more likely the lethal lesion in cellular

TABLE 1-2 Yields of DNA Damage Necessary to Kill 63% of the Cells Exposed

Agent	DNA Lesion	Number of Lesions per Cell per D_{37}[a]
Ionizing radiation	ssB	1,000
	dsB	40
	Total LMDS[b]	440
	DPC[c]	150
Bleomycin A2	ssB	150
	dsB	30
UV light	T<>T dimer	400,000
	ssB	100
Hydrogen peroxide		
0°	ssB	<2,600,000
37°C	?	
Benzo[a]pyrene 4,5-oxide	Adduct	100,000
Aflatoxin	Adduct	10,000
1-Nitropyrene	Adduct	400,000
Methylnitrosourea	7-Methylguanine	800,000[d]
	O^6-Methylguanine	130,000[d]
	3-Methyladenine	30,000[d]
2-(*N*-Acetoxy-*N*-acetyl)amino-fluorene	Adduct	700,000

Other similar aromatic amides produce about the same number of adducts per lethal event

[a] D_{37} = dose of agent required to reduce survival of cells to 37% of the number exposed.
[b] Calculated, LMDS = locally multiply damaged sites.
[c] DPC = DNA-protein cross-links.
[d] D_{37} calculated from individual exposures; no survival curves available.

SOURCE: J. F. Ward, C. L. Limoli, P. Calabro-Jones, and J. W. Evans (Wa88).

DNA; these result from a high local energy deposition in the DNA (in such a volume, multiple radicals cause multiple lesions locally); (5) the individual lesions making up an LMDS can be widely separated on the opposite strands of the DNA; if they are separated too much, they could be repaired as individual lesions.

Physics and Dosimetry of High-LET Radiation (Neutrons)

Interactions of Neutrons with Tissue Elements

When neutrons impinge on a tissue medium, they will either penetrate it without interacting with its constituent atoms or they will interact with its atoms in one or more of the following ways: (1) elastically, (2) inelastically, (3) nonelastically, (4) by capture reactions, or (5) through spallation processes.

2
Genetic Effects of Radiation

INTRODUCTION

Ionizing radiation damages the genetic material in reproductive cells and results in mutations that are transmitted from generation to generation. The mutagenic effects of radiation were first recognized in the 1920s, and since that time radiation has been used in genetic research as an important means of obtaining new mutations in experimental organisms. Although occupational exposure to high levels of radiation has always been of concern, not until during and after World War II was there a concerted effort to evaluate the genetic effects of radiation on entire populations. These efforts were motivated by concern over the effects of extremely large sources of radiation that were being developed in the nuclear industry, of radioactive fallout from the atmospheric testing of atomic weapons and of the rapidly increasing use of radiation in medical diagnosis and therapy. In 1956 the National Academy of Sciences-National Research Council (NAS-NRC) established the Committee on the Biological Effects of Atomic Radiation (denoted the BEAR Committee), which was the forerunner of the subsequent NAS-NRC committees on the Biological Effects of Ionizing Radiation (BEIR committees; of which this BEIR V report is one). A series of reports from the U.N. Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) has also addressed the genetic effects of radiation exposure on populations.

Although there is a continuing need to assess the genetic effects of radiation exposure, for several reasons the perspective has changed somewhat from that in the 1950s. First, it is now clear that the risk of cancer

in individuals exposed to radiation is significant and that limiting exposure to radiation to reduce the risk of cancer also limits the genetically significant exposure. Second, the instruments and techniques used in medical radiation have improved significantly, so that the overall doses used in medical diagnoses are reduced and patient exposure in all but the targeted organs is lessened. Third, in regard to the induction of mutations, the greater current risk seems to result from exposure to chemical mutagens in the environment rather than from the exposure of populations to radiation. Despite changed conditions, estimating the genetic effects of radiation remains important for setting exposure standards, both for the general population and for those exposed in their occupations.

There are many difficulties in measuring the genetic effects of exposure of the human population to radiation and other mutagens. This is why, more than 20 years after the BEAR Committee first addressed the issues of radiation exposure, there is still uncertainty and controversy. The following are some of the difficulties and considerations that must be kept in mind.

The genetic effects of radiation are expressed, not in irradiated individuals, but in their immediate or remote offspring. The time lag is great because of the duration of the human life cycle, and massive epidemiologic studies with long-term follow-up are needed to accumulate sufficient data for statistical analysis. Moreover, for risk estimation of exposures that are not uniformly or randomly delivered to the entire population, the age and sex distribution of the exposed population and the different probabilities of having children for members of the population of each age and sex must be taken into account.

The mutations induced by radiation can also occur spontaneously. When humans are exposed to low doses of radiation, it is difficult to estimate what small increment of mutations is induced by radiation above that from spontaneous background radiation. However, radiation has been found to be mutagenic in all organisms studied so far, and there is no reason to suppose that humans are exempt from radiation's mutagenic effects. These mutagenic effects are expected to be harmful to future generations because, in experimental organisms, the majority of new mutations with detectable effects are harmful, and it is assumed that humans are affected similarly. Indeed, the harmful effects of mutations that occur spontaneously in humans are well documented, because many of them result in genetic disease.

The genetic effects of radiation must be detected through the study of certain endpoints, for example, visible chromosome abnormalities, proteins with altered conformations or charges, spontaneous abortions, congenital malformations, or premature death. In addition, radiation induced mutations may affect different endpoints to different degrees. For example, the dose of radiation required to double the incidence of one endpoint need

Atlanta Journal + Constitution Sun. 11-16-58

Staff Photo—Bill Wilson

NUCLEAR LESSONS AT GEORGIA TECH'S SUBCRITICAL REACTOR: L. to R.: Dr. E. W. McDaniel of Tech; H. H. Strozier, H. C. Hill, C. H. Griffin

2-FRONT ASSAULT

Georgia Power Looking to Atom

By ROBERT JOINER

A Georgia utility company is now engaged actively on two fronts in its steady effort to be among the South's first firms to "market" nuclear power on a wide commercial scale.

Those fronts of the Georgia Power Co. are research-development of generating facilities and training of its engineers in nuclear technology.

The company and 13 other utility companies and seven manufacturing firms are jointly constructing a 100,000-kilowatt nuclear power plant at Monroe, Mich. That group, the Power Reactor Development Co., is one of five similar ones working toward the common end of commercially feasible nuclear power.

• • •

PARTICIPATION in the Michigan project, known as Enrico Fermi, was Georgia Power's first big-scale approach to the Atomic Power Age. Construction of the plant began in 1956 after much preliminary planning, and the facility is expected to begin operation by the fall of 1960.

The second "readiness" front—personnel training—is newer, closer home.

It calls for the intensive training of power company engineers in nuclear reactor engineering. That's a big thing in advancing the Nuclear Power Age, emphasizes H. H. Strozier, assistant chief planning engineer for the company.

One class of 34 engineers graduated recently in nuclear engineering after a year-long course. They studied the design and operation of nuclear power facilities.

• • •

ANOTHER CLASS of about the same number is being formed now and will begin in January, 1960. There is a likelihood that still another class will open up early in 1960.

Mr. Strozier, who is in charge of the special training program, expects at least 100 of the company's approximately 300 engineers to be indoctrinated in nuclear power by the end of 1960.

He talks enthusiastically about the courses, saying that as far as he can find out Georgia Power is the first utility company in the nation to offer such training.

All trainees are selected from the ranks of company engineers. "While it'll probably be several years before we have a nuclear power plant in Georgia," Mr. Strozier commented, "it's to our advantage to be ahead in trained manpower. An unexpected breakthrough may put us into nuclear power sooner than we now think."

• • •

IN THE MEANTIME, the nuclear-trained engineers will have to study at home, as well as keep abreast of developments through technical publications, Mr. Strozier suggested. Also, he said, they'll probably have to take a refresher or extended course before stepping into actual practice of the nuclear power business.

Nuclear power operators must be licensed by the Atomic Energy Commission, the company official said. He believes most of the men who go through special company courses can measure up to it—or come mighty close.

The course of instruction was conducted principally by 18 professors and engineers from Georgia Tech and Emory University. Helping them were scientists and technical men from Oak Ridge National Laboratory, Atomic Power Development Associates, Atomics International (subsidiary of North American Aviation), Babcock & Wilcox, General Electric, Westinghouse, Allis-Chalmers and Duquesne Light Co.

• • •

GEORGIA POWER engineers and teachers of mathematics, physics and other sciences at Tech and Emory developed the course materials, which make up two thick volumes.

More than 100 company engineers applied for the first course. These came from the Atlanta area. Subsequent classes will include the company's engineers from outside Atlanta.

Each of the weekly classes lasted two hours. All classes were conducted on company time. Each applicant pledged at the outset to devote at least four more hours per week of his own time for home study.

The engineers saw some demonstrations of nuclear equipment at Georgia Tech. However, no classes were conducted with that equipment.

The engineers saw some demonstrations of nuclear equipment at Georgia Tech. However, no classes were conducted with that equipment.

• • •

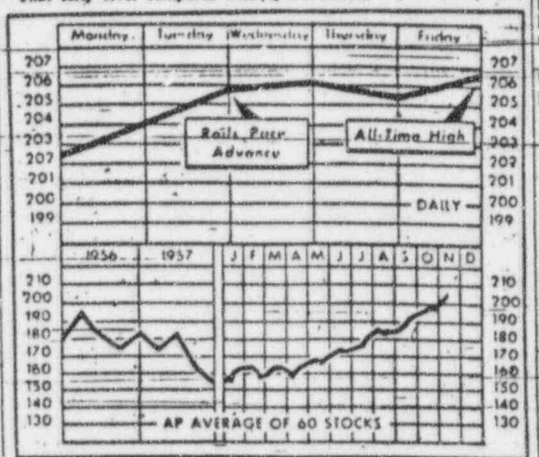
ONLY PERSONNEL with at least a B.S. degree in some field of engineering have been accepted for the course, Mr. Strozier said. Also, no engineer who graduated from college prior to 1935 was taken in.

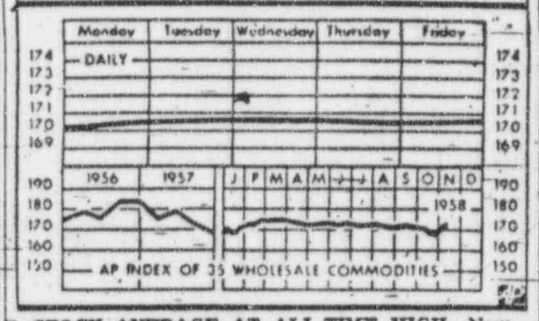
"The older fellows did as well as the younger ones, as it turned out," Mr. Strozier recalled. The oldest was 45, the youngest 27. Course grades ranged from 96 to 70.

As a result of the training thus far, Mr. Strozier declared, the company has a number of engineers with nuclear training "comparable to that given at Oak Ridge."

counts the improvement in earnings and dividends for a year or more ahead." He adds that "on the basis of today's values, stock buying should proceed on a cautious basis." Another forsees "only a modest improvement in business until 1959, ranging 6 to 9 per cent over this year's level." Still and all, the majority of traders appears determinedly optimistic. Their faith has remained unshaken through intermittent spells of profit taking. At mid-week prices reached the high-water mark, and it was then that the Times combined average touched 333.85.

That lofty level compares with





STOCK AVERAGE AT ALL-TIME HIGH—New York, Nov. 15—The Associated Press average of 60 stocks chalked up its third straight weekly gain when it closed Friday at an all-time high of 206.6 from 202.4 a week ago. The commodity index rose for the second week in a row, closing at 170.6 from 170.1 in the preceding period. Livestock showed the best gain.

Rutherford L. Ellis

Sima Bray

Ellis and Bray Top Officers at Lipscomb-Ellis

Rutherford L. Ellis was elevated to chairman of the board, and Sima Bray was elected president of Lipscomb-Ellis Co. at the firm's annual meeting Saturday.

Mr. Bray, a graduate of the University of Georgia, is a past president of the Atlanta Assn. of Insurance Agents and the Georgia Assn. of Insurance Agents. He helped organize the Southern General Insurance Co. He is a director of that company and the Chatham Towing Co. of Savannah. He has been an officer of Lipscomb-Ellis Co., insurance and real estate agency, for 13 years.

Other company officers were re-elected at the annual meeting.

FURNITURE