

Chapter 5

Implementation of the Rad Con Manual and the Advent of 10 CFR 835, 1995-1996

From this chapter on I will discuss all events that occurred, whatever the topic, as much as possible in chronological order. In some cases I quote from contemporaneous meeting notes. As usual, if I have misquoted anyone, I hope that someone will let me know.

ALARA Engineering Group, Rad Engineering Subgroup (AEG-RE) Meeting, 26 January 1995

ALARA Engineering Group (AEG) Leader Gloria Mei told us that although AEG's workload was heavy, the vacancy shown in the new organization chart for the retired Sam Gheesling's position was frozen: it was "not the right time" to hire a new person. So the Radiological Controls Section (RCS, AEG's section) might hire a subcontractor or someone from within ORNL, but not for months.

Fetal Protection

In the Federal system, when a female worker becomes pregnant, she has the right to "declare" her pregnancy and thus be afforded any radiological protections that seem appropriate. But declaration must be voluntary: in an analogous case involving lead, the Supreme Court held that a pregnant woman could not be forced to be protected above the level of any peer co-worker and thus could not be involuntarily subjected to extra restrictions. Nursing mothers can also declare, if there is a possibility of intake of radioactivity by the infant. At ORNL, when a woman became pregnant, she was supposed to go to "Medical" (the Health Division) and in effect register her pregnancy; a nurse would ask her if it was her first baby, how many weeks along she was, who her obstetrician was, and so forth. If she declared, Medical would then notify the Office of Radiation Protection (ORP) and the Office of Safety and Health Protection (OSHP, covering industrial hygiene and industrial safety). The declaration triggered surveys of the woman's work area(s) by ORP and by OSHP. For non-rad workers, there was usually nothing special that needed to be done regarding rad protection, but even so, it was useful for women to declare so that the area rad techs knew where all the pregnant women were when, e.g., a "hot" object was being moved.

The ORP survey had always been done by a rad tech, usually a specific female tech. But with the new 10 CFR 835 ("Occupational Radiation Protection"), there were documentation issues. Also, it seemed likely that in at least some cases, Medical was presenting the declaration form to each pregnant woman for them to sign as a matter of course, without making it clear that it was voluntary, although the form did say so. We had had such a case reported to us earlier in the 1990's. In other cases, rad techs or work supervisors told women who declared that they had to be removed from all exposure over background, which was not true. Earlier in the 90's also, a pregnant HFIR researcher who declared was told by the rad techs that she should avoid all exposure. She asked to speak with someone about this and was eventually referred to me. (I assume that this was because I was known to be informed regarding the recommendations of the national and international expert committees on this subject. Also, I had earlier been asked by a member of the (nationwide) DOE committee working on the 835 implementation guide for fetal protection to comment on the draft of that guide, "because of your great comments on the Rad Con Manual", as she told me.) So within ORP, I was probably the "authority" on the administrative aspects of fetal protection.

When I spoke with the HFIR researcher and later with her division radiological control officer (DRCO), I found that they both understood about the voluntary nature of the declaration and had already worked out a lower-dose work regimen for her that was well within the 500-mrem limit to the fetus; in fact, the dose would likely be less than 25 mrem. Her work would involve the same motions and source approach distances as before her pregnancy, so her physical abilities and her typical monthly dose were established by past experience; this was her second child and there were no health issues. There was thus no reason,

the three of us felt, for her to go to a no-dose regimen. So we all agreed on the sensible solution that she would be on the limited-dose regimen that she and her DRCO had worked out.

Because of my involvement in fetal protection issues, I was assigned to explore with OSHP the possibility of having a single procedure on fetal protection (instead of the separate ORP and OSHP ones) and the possibility of coordinating our surveys. We had heard about the Lawrence Livermore site's joint handling of fetal protection by its rad protection and industrial hygiene people. So I met with my OSHP opposite number. Several weeks later, the two of us met with Dr. James Phillips, head of the Health Division; his nurse-assistant; and one or two others. Dr. Phillips was cordial and we all discussed various issues. There was no one in charge of this meeting, however. Dr. Phillips was the senior person and a doctor as well, so everybody deferred to him when he wished to speak, but he didn't "lead" the meeting and thus not much was accomplished. He and his assistant made it clear that they did not care how ORP and OSHP handled the matter as long as it did not make any more work for them and as long as the pregnant and nursing women declared at Medical, or at least continued to send their declarations to Medical rather than directly to us. I thought that this might be a control issue with Medical; however, they were very sensitive to the legal aspects, so perhaps they just wanted to ensure that women were presented with the knowledge and opportunity to declare. As long as Medical notified ORP and OSHP promptly, we in ORP and OSHP were agreeable to having Medical be the sole recipient of the declaration form.

I was supposed to meet with Sims the next day about this. Obviously he needed to be informed, since if there was increased ORP-OSHP coordination and a single procedure were used, there would be interdivision agreements to be worked out, e.g., whose manual of procedures would include the single procedure. But the next morning, I was told that my meeting with him was cancelled and I should talk with my section head, Mlekodaj. Mlekodaj could not tell me anything about the matter and was fuzzy about the details. In the end, OSHP decided that they wanted to continue to have their own procedure and do their own thing without interfacing with ORP. I thought that the duplication of effort made for more work and documentation, but obviously there were "turf" implications here and I let it go.

Starting in November 1995, I began to work directly with the rad tech who had been the principal fetal protection surveyor in the Radiological Surveillance Section (RSS, the rad techs) and now had moved to the Source Control subgroup in AEG. Somebody had decided that it was advantageous for her continue to do the fetal protection surveys, partly because of her experience in doing the surveys but partly because the surveys would be on AEG's dime and not RSS's when chargeout to the pregnant woman's division was not possible. So I became the procedure-theory-counseling fetal protection person for ORP and she continued to be the principal surveyor. Another female, also a qualified rad tech in Source Control, substituted for the primary tech when she was on vacation or ill; our supervisor, Mei never considered having me do the surveys in the regular surveyor's absence because I was not allowed to qualify as a rad tech and thus was not an "authorized" surveyor. This would not have presented difficulties at other sites, where being a senior health physics person and, especially, being a certified health physicist would seem to qualify a person ipso facto to be able to perform such surveys. But at ORNL, RSS opposed allowing anyone else but "official" techs to do official surveys. So we AEG rad engineers were not allowed to qualify as ORNL rad techs as part of our rad engineering work if we had not done so already; Rich Utrera continued his qualification from back when he was in the rad tech section and Kurt Geber kept his training up as a member of the DOE RAP team, but Mei and I normally had to enlist a rad tech if we wanted a survey done for official purposes.

AEG-RE Meeting, 3 March 1995

Utrera reported that a set of Waste Acceptance Criteria came from the Radwaste division, but when asked, he said he did not know the basis for it. Utrera was a likeable guy and smart enough, but he did not seem intellectually engaged in his work. Mei, Geber, and I would all have asked, "Where did you get this, Radwaste people?" had we been the contact instead of Utrera, but he often failed to ask such questions.

Mei told us that she wanted two AEG-RE people working on each task for which a report might be written -- a principal and a "backup" -- for peer review and for the principal to have "someone to talk to". I thought that the double-teaming was wasteful since Mei wanted the backup to be fully briefed at all times. We peons felt that we didn't have time for it except when we were actually going to be away.

At this time, Mei began to urge us to "sell our services" (although she didn't use that term until perhaps 1997) and she solicited topics for potential talks on AEG activities, to be given at rad tech supervisor meetings, DRCO meetings, ORNL Executive Committee meetings, etc. In the early days, there were extensive technical exchanges of information and project discussions in these AEG staff meetings. But administrative things took more and more time and the meetings lengthened. Finally Mei decided to try to limit them to an hour or less to reduce non-productive (non-chargeable) time. Since the administrative stuff was covered first, it was the technical exchange that suffered.

The ORNL Rad Protection Procedures Revision of 1995-1996; Bomb-Throwing and Harassment

In 1996, the DOE downgraded the Rad Con Manual (RCM) to the status of a "nonmandatory technical standard", while 10 CFR 835 was to be implemented by the end of 1995. Thus the ORNL health physics procedures had to be revised to agree with 835 and -- because it had been decided that these procedures were to be the 835 implementation mechanism for ORNL -- to remove or make optional any requirements that ORNL did not want to be held to under the Price-Anderson Act and Amendments (P-AAA). In March 1995, I discussed with R. Vince Bishop, the ORP computer and procedures honcho, the incorporation of 835's design requirements and related requirements into RPP-128 (on radiological design), for which I was the subject matter (technical) expert. This was a cordial meeting. But when we met again the next day on the same procedure, it was, as my notes of the meeting said, "A bust -- he had a hissy fit". I don't recall the details, but I think he had hoped to shrink the procedure by eliminating requirements wholesale. So he was upset when I pointed out to him that there were some very specific requirements in the "design and control section" of 835 and that DOE's further expectations for this section were pretty clear from the associated 835 implementation guide. What I told him needed to be included was thus at odds with his plans for what to leave out.

In November 1995, Mei sent to someone Mei's and my comments on the revision of RPP-128 and RPP-310 (on operational review). This person was a former rad tech who, I believe, was in a different ES&H procedures group and was loaned to ORP to work on the revision. He seemed reluctant to incorporate our comments. In both this case and the Bishop RPP-128 case above, people who were not rad engineers or senior health physicists with ALARA expertise were in charge of and seemed to have near-veto power over what went into procedures that were essential to AEG work. In March 1996, giving various examples, I pointed out to Mei that RSS was hostile toward AEG's involvement in reviews and that it was clear that some or even most RPP reviews were avoided by RSS and the O&R divisions. She was sympathetic -- what I said was not news to her -- but she could only promise to talk with Mlekodaj.

Eventually, I was given RPP-310 to revise to be consistent with 10 CFR 835 requirements. This was because (1) the procedure "belonged" to my section, RCS, and (2) I had been the main author of the first RPP version and had produced the justification for the original trigger levels. I thought that only minor revisions were necessary since the procedure already satisfied most of the 835 requirements. But the issuance of my new draft RPP-310 for internal ORP review prompted many RSS comments. RSS personnel -- especially Dale Perkins, the HFIR-REDC rad tech group leader -- criticized various aspects that they wanted to change. Most of all, they wanted to revise Table 310-1, the rad trigger table, which had been in existence for at least four years at this point and which I had kept essentially the same in the draft. RSS and line management had been largely ignoring the requirements of this table all these years, as I had pointed out to Mei. But now they would have to comply with it, if it was part of an 835-based set of procedures. They exerted a great deal of pressure on us. Mei directed me to accommodate them as much as possible, so I put some Perkins-proposed changes in the table. I give some examples

below of comments on the draft from Gary Kelly, Willie Hayes, Roger Davis, and Lynn Sowder, all rad tech complex leaders, with my replies. (The spelling and wording are just as they posted them.)

Kelly: This procedure is complicated and hard to understand. What we need is a simple procedure based on a reasonable Table 310-1.

Hayes: I agree! I especially question having to bring in the AEG rep for removable contamination in excess of 100 times Table 220-1 [the RCM/835 surface contamination table].

Davis: I agree with Mr. Hayes. I do not think that the AEG rep needs to be brought in for the contamination levels specified. Most HP techs and supervisors have experience with contamination levels much greater than the table specifies and have the knowledge to take the precautions that are needed. If they feel uncomfortable with the levels, then they could ask for assistance.

Sowder: I agree with all the above comments. The first six pages all almost incomprehensible. The rest of the procedure is almost a copy of [the existing version]. A level of >100 times removable contamination for TRU [transuranics] would only be 2000 dpm. If you want a removable contamination level [trigger], it should be somewhere in the mR/hr range and should only be used if you don't expect these levels. I also don't think we need a ton of guidelines to do our jobs, give us some broad guidance and trust us to consult with RCS when needed.

Westbrook: (Replying in May 1996): A modified version of Dale Perkins' proposed Table 310-1 will replace the current table and the text will be revised to agree with it. It is hoped that other changes made in the text will make the procedure easier to understand.

Kelly: Lets keep the procedure simple. [Step VI.3.b] is an example of what is not needed.

Kelly: 120 DAC/Hours for Cm-244 is only 1320 Dpm and for 200 DAC/Hours it is only 2000 DPM for Cm-244. Assuming only a 50 protection factor for a full face respirator, working in 200 DAC/Hours would one give a dose of 10 mr. And most of the time you will not know the number of DAC/Hours until after the job. So, I think we need to delete DAC/Hours and contamination levels from this Table. Also the person who needs to be in on each level of review more than the facility manager or ALARA [AEG] engineer, is the worker's supervision with the division director of the worker being on Level 2 -- provided we drop the DAC/Hours and contamination level requirements.

Kelly [Later]: OK I made a mistake -- I assumed the procedure was using DAC/Hours as DAC values. I do not know why we would even consider letting a person receive even 40 DAC/Hours. So, again I believe we need to delete the DAC/hours.

Note that the RCM had specifically stated that 100 times its Table 220-1 limits was a good choice for a trigger level for "formal radiological review". As I said earlier, this review was provided by us rad engineers at Level 2 and above; other people, such as higher managers, were brought in at higher levels. Making the rad engineering review dependent on the rad tech organization's judgment as to when they thought they needed help would defeat the purpose of having set trigger levels; also, all the other DOE sites we knew of had set trigger levels, as we had found from Mei's service on DOE audit teams, from AEG members' attendance at conferences, and from viewing other sites' procedures on the Web. If there were no surface contamination trigger levels, as recommended by Hayes, or airborne contamination levels, as recommended by Kelly, then there would be no required formal review by a rad engineer at any level of contamination, however high or widespread it might be. This too departed from the practice at other sites. Let me say this in another way, since it is a very important point: the rad tech complex leaders' implicit assumption was that they and the rad tech group leaders had the knowledge and experience needed to make all decisions relative to radiological control of contamination in any form, without the need to consult rad engineers or senior professional health physicists unless they decided to.

The rad tech complex and group leaders viewed themselves as professional health physicists and so, in any document that used that term with regard to operational health physics, they saw themselves. As I said before, few of these supervisors had four-year degrees; some had two-year degrees; and some had no degrees at all. (One had a master's degree, although not in health physics.) Yet the comments above

implied that they would all be considered to be on the same level as or higher than the rad engineers, almost always without any special training for this beyond their rad tech training and whatever degrees they had, merely on the basis of their field experience. Again, these supervisors were about 13 people dispersed all over the site and in formal technical contact with one another through their supervisory staff meetings, their requalification training, and their internal memos. We in AEG thought the RSS arrangement was too informal and too dispersed to allow for consistent review by RSS -- not to mention that they often seemed too beholden to O&R divisions to provide truly "independent" reviews, that they were light on documentation skills and commitment, and that we disputed their contention that AEG had "no field experience" and was thus disqualified from performing reviews of work. We thought that we were advocating a review approach consistent with the rest of DOE sites -- a position that RSS did not dispute, but simply ignored.

Readers knowledgeable about health physics will have noted Kelly's statement "I do not know why we would even consider letting a person receive even 40 DAC/Hours". First, the unit is the DAC-hour, not the DAC/Hour, a significant difference in doing dose calculations. Second, a DAC-hour is defined as an airborne concentration of a radionuclide such that if a worker breathed it in over an entire working year, he would receive 5 rem (the Federal annual limit for the dose equivalent to the whole body). Breathing it in over an working year of 2000 hours would expose the worker to 2000 DAC-hours, so that there would be .0025 rem, or 2.5 mrem, per DAC-hour. Thus 40 DAC-hours would amount to 100 mrem (and only a tiny fraction of this with a respirator). This is well within what a worker might get from external dose over the course of a job, although not usually a routine job. This corresponded to the trigger dose for an individual dose for a job or task at (review) Level 2. Kelly thus demonstrated his ignorance either of how much a DAC-hour was in terms of dose or else of his sharing of many workers' quasi-superstitious avoidance of airborne-imparted dose even at the cost of increased external dose.

Although I tried to reply diplomatically to their comments, RSS was still not happy, because not all their changes were included in the revision. In June 1996, Mlekodaj told me to attend a meeting to discuss RPP-310 with Hunt, Sims, and him. I had prepared a handout explaining the rationale for the table and the text, but even though the meeting lasted perhaps 40 minutes, we didn't get past the first item or two. I would explain the rationale behind a particular subsection wording and then Hunt would speak, almost sermon-esquely, on what seemed to be tangential issues. He spoke of keeping the customer happy, of RSS' need to be responsive, etc., and not about, e.g., the best level at which to set the individual dose trigger for a job. After a while, Hunt dominated the conversation completely.

I couldn't understand why Sims allowed all this. The meeting was supposedly a resolution meeting, but it was not being conducted that way. It seemed bizarre that comparatively little time was spent on the actual wording of the procedure. I was enlightened about this later by Mlekodaj, who explained that in fact Hunt had refused to consider the procedure at all either in the old or revised draft forms. Later, Mei too explained that RSS was demanding certain changes -- which Hunt had not brought up in the meeting supposedly held to discuss them -- that would essentially eliminate AEG from all but the most extreme and dose-heavy operations. I saw that Hunt's just talking around the issues and using up the meeting time had provided him and Sims with a "fig leaf" to cover them: they could say they had met with me, the putative author of the procedure, and had "tried" to resolve issues but were "unable" to do so; thus Sims "had" to make an executive decision. This was the first but not the only time that I observed somebody from RSS using this technique, which I suppose we could call the "Talk a Lot and Maybe Nobody Will Notice That Nothing Happened" technique.

At the June 1996 AEG-RE meeting, Mei said she wanted to have Hal Butler review the procedure. I objected, saying that Butler should handle the revisions even of all of the procedures if it was a question of time, but should not handle RPP-310 alone just to deflect criticism away from AEG. I thought that Butler, having been head of the rad tech organization for so long and having been against ALARA

engineering involvement prior to his retirement, might side with RSS out of loyalty and deference and ignore other considerations (independence, consistency, DOE intent, etc.). We left it as "to be determined by the higher ups". Later in June, Mei again stated that "they" wanted more changes.

As a result of the negative onslaught in the comments and the extended behind-the-scenes maneuvering, the procedure was taken away from me (I believe by Sims) and given to Mei to revise. She made further changes, but Perkins and other RSS people were still not satisfied; they insisted that the AEG reviews were unnecessary and intrusive and demanded even more changes. I think that RSS, emboldened by winning nearly every battle with AEG, smelled blood and went in for the kill.

In late June 1996, I met with Mei and Mlekodaj regarding RPP-310. Notes that I prepared for the meeting included a quotation from Bishop, who had told me that at a preliminary meeting of the [rad protection] triennial audit team, ORP was asked if we were still complying with the [RCM] requirements, since they were still in our contract, and ORP was able to answer yes. However, he said, if we took any of these requirements out of our RPPs, then we might not be able to make that claim. So, I pointed out to Mei and Mlekodaj that the approach that AEG was proposing for RPP-310 was to meet "the intent of the RCM". Included in my notes was a series of questions that we should ask as to what ORNL management wanted in the way of an operational review. I noted that "there may be widespread ignoring of the current review requirements. AEG suspects [actually we knew it for a fact] that field [rad techs] are not always activating the review when it is called for by RPP-310. Even with the revised trigger levels, this may still be the case without a strong management commitment to holding what reviews remain after the revision". I made the last statement since Mei, undoubtedly in possession of more information than I had, had told me earlier that probably the trigger levels for AEG review would rise.

We AEG peons were dismayed by the idea of the trigger levels rising, since they were consistent with RCM guidance and other sites' practices. But Mei and Mlekodaj said that they were powerless. In July 1996, Mei told us that Butler, Hunt, and Mlekodaj worked on the revision of RPP-310 and it went out for comment to the complex and group leaders -- but not to AEG even though it was supposedly "our" procedure. Mei, however, heard about it at Hunt's supervisory staff meeting (which she was allowed to attend as a courtesy) and obtained a copy of the revision, I think from Mlekodaj. Clearly the procedure had now been taken away from Mei and put into the hands of Mlekodaj, who allegedly still did have the final say over it. We AEG peons, especially Geber and I, were upset by this process. We felt that the rules of procedure revision were being followed in the case of other people's procedures, but not in the case of AEG's procedures. We had not produced the answer that RSS wanted, yet no manager had the guts to order me or Mei to put in the changes RSS wanted. So it was taken away from us to be doctored.

Mei's information was correct, except that the person actually rewriting the procedure turned out to be Perkins, the HFIR-REDC rad tech group leader: as a result of further behind-the-scenes dealmaking, Sims and (I assume) Hunt apparently gave the procedure to him. He took out the contamination level triggers completely and changed the whole-body dose rate trigger from the existing and RCM-recommended 1 rem/hr to 5 rem/hr. As justification for such a significant change, he told Sims that he had looked at the Rad Work Permits for all work involving 1 rem/hr or more and had checked the associated doses. He concluded that at ORNL, measured (experienced) doses were not significant (in terms of approaching limits) below 5 rem/hr. AEG was never provided any written documentation of this analysis and I believe that Sims was not either -- it seems to have been only an oral assertion by Perkins. Perkins also invoked "customer service" as a particular reason to eliminate or increase trigger levels: he asserted that only at very high dose rate levels should work be slowed down by the necessity of having a formal radiological review (RPP-310 Level 2 or above). The idea was that a review by a rad engineer should be performed only when the "customer" could see that it was absolutely and demonstrably necessary.

In August 1996, Mei forwarded to Geber, Utrera, and me an E-mail message she had sent to Sims and Mlekodaj, stating that at Mlekodaj's and Hunt's request, she and Perkins had met to finalize the revision of RPP-310. They agreed on all but one item, the dose rate trigger for the new Level 3 review (which was the former Level 2 review, i.e., the first level at which AEG was included). She still proposed 1 rem/hr and gave a list of technical reasons for her position. For example, she noted, in a 5 rem/hr field, in only 5 minutes a worker would receive a dose of 414 mrem (about two-thirds of the ORNL annual ALARA goal (administrative level) of 600 mrem) and in 10 minutes he would receive 833 mrem (more than the goal); at 1 rem/hr, these doses would be only 83 and 416 mrem respectively. She said that Perkins told her that RSS had reviewed 100 Rad Work Permits that involved dose rates greater than 5 rem/hr and that he claimed that in each and every case the worker received a low dose. But she also pointed out that in the past several months there had been several rad jobs that AEG had found out about only after the job was completed and that had inadequate operational procedures or miscommunications between O&R personnel and rad techs, resulting in personnel contaminations or "surprises" during the course of the work. She noted that the doses in such cases had not turned out to be very high, but neither were the dose rates as high as 1 rem/hr. She cited the advantage of the independent review that AEG provided and the fact that the complex leaders didn't usually have the resources to provide special shielding or dose calculations. She said that, e.g., Pacific Northwest National Laboratory (PNNL, run by Battelle) had a dose rate trigger of 1 rem/hr to the whole body. She pointed out that she had talked with other DOE complex people at the last Health Physics Society meeting and found that "the radiological review process and requirements at ORNL are not as stringent as at most of the other national laboratories".

So Mei had made the point that miscalculating time spent, or exceeding time because of exit difficulties, could result in doses significantly higher than anticipated and significant in terms of the ALARA "speed bumps". She had also pointed out that the RCM recommended 1 rem/hr as the trigger level and that other sites we knew of had either 1 or 2 rem/hr as their triggers -- and the 5 rem/hr was thus a significant departure from the DOE norm. She also reiterated to Sims and Mlekodaj that RPP-310 reviews were known by AEG to have been avoided by line management and that RSS knew this. While Mei put her figures and reasons in writing, there is no evidence that Perkins did, and thus the basis for Perkins' 5 rem/hr may not be in ORNL files to this day. This was contrary to the 835 requirement that decisions made regarding ALARA -- as this decision certainly was -- must be documented. But Sims overruled AEG on both the contamination trigger removal and the dose rate trigger increase.

In our August 1996 AEG-RE meeting, we discussed the new trigger level. Geber and I expressed concern that with the complex leader now being the higher-level reviewer for the new Level 2, the complex leader might routinely "delegate down" the Level 2 review to a rad tech. Mei thought that since the procedure said "complex leader", it would be okay (she thought that the complex leader would use good judgment about delegating his responsibility). But she also said that it was out of AEG's hands so we shouldn't fret about it. I pointed out that HFIR had a dedicated professional (OSHP) industrial hygiene person but not a dedicated rad engineer or any dedicated professional health physics person other than the rad tech supervisors; hence unlike the OSHP person, AEG was not in on all work planning meetings and relied on the techs for information. Mei said that as soon as it was clear that a job required a Level 2 review, the rad techs needed to call us regarding whether a Level 3 review might be required instead. I pointed out to her that a recent talk with a HFIR (RRD) section head showed that the rad techs were not always straight with AEG, but Mei told me to talk with HFIR complex leader Davis again, to keep open the lines of communication. It was the same old issue, but the optimistic Mei said it was a new beginning and we should start over. I sighed as usual at Mei's endearing but exasperating Pollyanna attitude.

Note that RSS was already in most cases the gatekeeper for AEG involvement, via RPP-310. That is, they were supposed to do the dose estimate (if it was done at all, since no procedure seemed to call for it) and they were to advise the O&R people that a review was necessary. The O&R people were supposed to be familiar with RPP-310, but most often when a review was missed, their excuse was that they were not

aware of the need for a review and RSS had not told them. RSS did not like to have to give their "customers" the news that a review was needed because, as I have said, this represented a potential delay in the schedule (particularly since the rad techs themselves were often told at the last minute about jobs); because it involved an "outsider" poking into O&R division business; and because the review might result in changes that line management would have to make. Besides the natural reluctance to be the bearer of bad news, it was clear that some RSS people simply didn't like AEG. In part it was personal (some didn't like me, some didn't like Geber, some didn't like even mild-mannered Mei), but in part it was the whole idea of rad engineers as being "beyond" and thus "above" the status-sensitive rad tech organization. The animus was made most evident by the note of glee, of twisting the knife that was seen in many of the RSS comments and the ORP Suggestion Box entries (see below). But it was also evident in the contemptuous or impatient way that we were often spoken to when a rad tech called us for a review.

As time went on, it became obvious to us that jobs were going on that, by the sound of them, were definitely at the (new) Level 3 or above for review but had not been referred to us. It was also evident that RSS was complicit in this because they could not fail to know about work in their areas and about the associated doses. With the change in trigger levels, RSS got a version of RPP-310 that supposedly was more congenial to them. But even so, many were still complicit over the next few years in further avoiding RPP-310 reviews by AEG even at the higher, less conservative trigger levels.

An egregious example occurred on 9 September 1996, before the new procedure revisions had finally been settled. Mei and I attended a HFIR anniversary ceremony. A HFIR rad tech chatting with me asked if I was covering the hot job to be done that morning. Mei and I were startled -- we knew nothing of it. We inquired and found that the job was a hot leak check with a nominal whole-body dose rate of 10 R/hr. It was almost ready to start -- without an AEG review. We spoke to complex leader Davis and a Research Reactors Division (RRD) participant in the job. We discovered that Perkins had ordered Davis to sign the AEG box (i.e., where I should have signed), without Mei's or my knowledge. I quickly went over the job with the people and signed the RWP; later, I sent off the required official memo of review. I then spoke to Perkins about this in person. He was only mildly apologetic: he said that RRD did not have time to wait while he requested and got a review from me. So he did not bother to do so, but instead had Davis sign off. Mei discussed this with Hunt and with Mlekodaj, with no apparent corrective action taken.

This was deliberate procedural violation, pure and simple. We had caught RSS red-handed and they had admitted what they had done. But as usual, no one was disciplined in any way. There was not even a Radiological Awareness Report written for this violation, much less an occurrence report.

The ORP Suggestion Box and Other Harassment

The ORP Suggestion Box was a computer "box" in which suggestions could be posted by anybody in ORP and replied to by any one of four ORP managers: the director (Sims) or the section heads (Hunt, Mlekodaj, and Thein). We were told that the software device that would reveal the name of the suggestion submitter to the managers had been "turned off" and that all suggestions were thus anonymous, but this was widely disbelieved. A submitted suggestion did not appear immediately in the box viewed by the ORP "public"; rather, it appeared only after a manager had read it and had chosen to respond to it. Suggestions that were deemed to contain bad or intemperate language or to be irrelevant or untrue could thus be deleted by an ORP manager so that ORP at large never saw them.

Most of the suggestions were answered by Hunt. It is true that most suggestions seemed to be from rad techs and were concerned with issues most of interest to them. However, Hunt would also answer questions that were about or mainly about areas that were in the purview of our section or the dosimetry and records section, as though it were an RSS-only suggestion box. I spoke to Mlekodaj about this on numerous occasions, but nothing was done about it -- he said that Sims allowed Hunt to do it, so he could do nothing. Mlekodaj did not seem to want to take the issue up with Hunt himself. Note that Sims never

and Mlekodaj seldom if ever added any response to the Suggestion Box giving AEG's side; Mei, of course, could not do so since she was not authorized to post responses. Thus AEG was at the mercy of RSS since RSS attacks on AEG in the Suggestion Box were answered -- for whatever reason Hunt and Sims and Mlekodaj may have had -- by Hunt.

In early June 1996 a suggestion appeared in the Suggestion Box ("ORP Suggestion: ALARA?") that upset us because of its anti-AEG tone. Here is that suggestion, verbatim, and Hunt's response.

Suggestion: "After painfully reviewing yet another ALARA RPP310 nightmare, I think we as a group need some serious evaluation of their intervention. We have had several reviews performed, and I am in no way putting into question the effort put forth by the AEG, but after going through several of these "reviews", we have seen absolutely ZERO benefit to ourselves or our customers. In other words, there has been NO comments, suggestions, or changes to any of our tech's requirements that would in any way reduce exposures or releases. ALARA is not only a concept of keeping exposures ALARA, but also using common sense and being financially reasonable. Waiting for hours, or even days, for a review which adds no value to our program, is a serious waste of our customers resources. Suggestion: Have the reviews more directed towards our direct supervision in questionable situations of high dose rates or contamination levels. This allows them the opportunity to decide whether AEG could add value to a review, or decide, as a team, whether or not they feel comfortable making the decision. In this day and age of consistent cuts, I think it would be wise of us to quite whittling on our own wooden leg!"

Hunt: "I think this suggestion is correct in looking at everything we do from both a cost-savings and a customer perspective. The best place to do this would probably be through the procedure comment process. RPP-310 is out for internal review right now."

Note that the suggestion writer is addressing his fellow rad techs, referring to AEG as "they"; note the explicit statement that AEG should be involved only when the complex or group leader ("our direct supervision") determined that it was desirable, i.e., that RSS should be the complete gatekeeper for AEG involvement. And finally, note the explicit reference to customer resources and budget pressures. Hunt failed to address the specifics of what the suggestion writer said -- e.g., he gave no clue whether he thought the suggestion to eliminate AEG reviews had merit or not -- but he still patted the writer on the back and encouraged him to comment on RPP-310. Mlekodaj chose not to add any reply at all even though we urged him to. But someone sent in an indignant counter-suggestion, which I give below with Hunt's response.

Suggestion: "To the person who wrote the ALARA RPP310 nightmare comment, 2 questions? 1. Who died and left you in-charge? 2. It sounds like the problem in cost-saving is on the RSS side? Question to J.B. [Hunt], you stated that, "I think this suggestion is correct in looking at everything WE do from both a cost-savings and a customer perspective." Who is WE? Is J.B. the problem? Is RSS the problem? Is RSS 50% or 100% of the problem?"

Hunt: "I didn't really see a suggestion in this one, but in response to the writer's comments: 1. I didn't take the earlier comment to be of the "I'm in charge" category. An employee had a suggestion and used the existing mechanism to make it. I saw nothing inappropriate in the spirit of the comment although the wording showed a little hostility ("nightmare", for instance) but I took it to be a measure of frustration and not necessarily hostility. 2. The "we" I spoke of is all ORNL employees. If "we" don't figure out how to do our work cheaper, then "we" will be out of a job. The "problem" on finding less expensive solutions rests with all of "us". The management of the Lab has specifically asked us to look at the "value added" of everything we do. If it adds value (and safety certainly adds value), then we should do it if the benefits outweigh the costs. IN that spirit, I think the earlier suggestion was appropriate. My earlier comment was that a mechanism already exists to comment on procedures, and RPP-310 is out for comment now."

The first suggestion, of course, had not been to look at everything that "we" ORNL employees did, but at one specific AEG function. Hunt said he took the comment to be an expression of frustration rather than hostility, but many people (including some rad techs) did not see it that way. In his reply to nearly every suggestion, Hunt waved at us the threat of losing our jobs if we couldn't work cheaper. He also noted that the earlier suggestion was appropriate in the spirit of "our" seeing if the benefits of safety outweighed the costs, but he himself did not address the issue or take issue with the writer; thus he seemed to approve not only of the expression of the sentiment but also of the sentiment itself.

A few days later in June 1996, Mei wrote an E-mail message to Mlekodaj (copy to Sims and Hunt), with reference to the "ALARA nightmare" suggestion. Mei stated that she thought that AEG review did add value to work and she gave some particular reasons why. She noted some recent rad jobs that she thought showed how good planning had resulted in project success (citing the Out-of-Tank Evaporator project, the RRD Tower Shielding Reactor control ball removal transfer operation, and "several HFIR jobs", all of which I worked on and which are mostly discussed elsewhere in this chapter) and she described the general aspects of AEG's involvement in them. She pointed out that even in the case of last-minute jobs, AEG still managed to talk with the managers and visit the workplace as needed. She asserted that she could not recall any instance in which AEG caused delay of the work schedule (i.e., there were no such instances and certainly not "days"). She also noted, contrary to the suggestion, that there were no comments that were unresolved when RPP-310 was issued (as Rev. 1) and that Mei herself had initiated the most recent revision to the procedure before the mandatory change date in order to make it "more effective and more customer-responsive". She said that it "would be appropriate for the heads of RSS and RCS and perhaps the head of ORP to determine what ORP wants in the way of radiological review: who should do them, what should trigger them, and how they should be conducted". She asked for management guidance on this issue. But I don't believe that Sims provided her with a substantive answer.

After the ORP-only comment period had closed on RPP-310, the procedure was further revised and sent out for ORNL-wide comment. The two suggestions below, with the reply, were of great concern to AEG. The "sops" mentioned were the RSS SOPs, or Standard Operating Procedures, used by the rad techs; of course these were written by RSS for use only by RSS, so comparing the ORNL-wide procedures to the SOPs was comparing apples to oranges.

Suggestion: "this suggestion is not a comment on rpp310, but a comment on the mess that rpp310 has caused. to my knowledge this has not happened with any of the sops. there are many things troubling with the authoring and resolution of rpp310. first, the author uses the radcom manual almost verbatim, and then blames the radcon manual. I thought that the radcon manual could be rewritten to ornlize [ORNL-ize] it, if the requirements were still met. also, once the resolution said something like: this manual goes to more than just rcts [rad techs], it also goes [goes] to rco [DRCOs] and div directors. meaning that non radiological people will use it. then concerning a comment over "source term", the defense of it being a standard technical term was used. well which shall it be??? these are just a couple of examples, but just look at how long the resolutions are! all in all, I think that this person is definitely intellectual enough to deal with this subject, but was a wrong choice for writing this procedure. she should have commented on it, but the procedure has suffered because of the way (and spirit) it was written. I don't intend this to be a slap in the face, but i believe that this is definitely the facts. and smart aleck comments won't help matters at all!!!!!! there is no need to respond to this suggestion, just my views."

Suggestion: "Although the comment period is closed, many of us hope that the author(s) of RPP-310 will read this comment. Recommend changing RPP-310's wording in the section describing "source term" to "radiation source". This is a common sense solution to avoid misunderstanding.

Hunt: "Although the internal review of RPP-310 is closed, it will still go out for Lab-wide review. Additional comments can be made then if the resolution of earlier comments was not satisfactory."

One reason that the comments and these suggestions regarding RPP-310 bothered us AEG folks was that, as I have noted, this procedure had been in the procedures manual for years, first in a pre- and then in a post-RCM form. My proposed revision did not change it much at all. Thus rad techs who were declaring themselves to be shocked -- shocked! -- to discover the offending provisions of this procedure were either admitting that they had not kept up with the manual and thus had probably avoided required reviews or were pretending to be indignant about something that they hadn't complained about before (with the exception of a few HFIR rad techs).

Another reason that these suggestions bothered us was that there was a rule against personal attacks in suggestions; any such were supposed to be deleted by Hunt et al. and were not to appear in the Suggestion Box. But in the first suggestion immediately above, there was an obvious personal attack: the writer clearly meant me because I was the RPP-310 revision author at the time and because some statements from my responses to the ORP RPP-310 comments were quoted. The appearance of this suggestion -- which was put into the "ORP-visible" Suggestion Box by Hunt -- showed us his unfairness even more than his reply to the intemperate "ALARA nightmare" suggestion had. We were also bothered by Hunt's suggestion that if an ORP commenter didn't like the resolution of his comment in the ORP-only comment phase, he should repeat the comment in the ORNL-wide review: it was stated explicitly at the time the procedures were sent out for ORP review that ORP people were to comment during ORP review and not during the ORNL-wide review, not just to correct obvious errors but also to air and resolve issues before the "customers" saw the proposed revision. Hunt's answer thus encouraged his people to break this rule.

Finally, the reader should understand some references in the two suggestions. First, the first suggestion claimed that I had used the RCM "almost verbatim". That was true, because we had revised it back when all the procedures were revised to become our RCM; in fact, we were ordered to put most of it in verbatim. Still, there were also many ORNL-specific features, such as having separate trigger levels for jobs and campaigns. So the writer's beef seemed to be that with the demotion of the RCM to a "nonmandatory standard", the procedure had not been gutted of provisions consistent with the RCM. I say "seemed" -- I am of course inferring this because the suggestor provided no information in his suggestion as to how to "ORNL-ize" the procedure.

Second, another allegation went straight to the issue of professional qualifications. I had indeed stated that not only ORP but also other divisions used the rad protection procedures and that we were thus speaking to a larger audience than just ORP. The writer then used this as a reason for me not to use the term "source term" in RPP-128 (on radiological design). But the real reason, as RSS comments on RPP-128 itself made clear, was that many rad techs were not familiar with this term. I had pointed out in my responses to the RPP-128 comments that this was a standard and universal technical term used by people who do dose and shielding calculations and that "radiation source" (the RSS-suggested term) meant something different from "source term". The second suggestion above said that using "source term" would lead to misunderstanding while using "radiation source" would not, but the opposite was true. Thus I defined "source term" in one of my comment responses; it was a lengthy explanation, but I wanted to explain clearly so that everybody would understand what it meant. I thought this was a respectful and helpful thing to do, but then I was criticized for the length of my explanation and for its being "smartaleck". The rad techs commenting would not accept that something could be put into a rad protection procedure that they did not already know about and understand, even a design procedure such as RPP-128 that they would normally not be interpreting or executing. It was as though every procedure had to be at the level of understanding of the least knowledgeable of them. (Of course there were some rad techs who did know what a "source term" was.)

Naturally, on the next project I worked on where rad calculations were done by an external entity, the analysts used "source term" exactly the way I had! I also saw it in various reports by ORNL engineers and researchers. I thought of the attitude of the belligerent rad techs as "Ignorant and Proud of It". Actually,

they were proud of what they did know, but they disparaged and discounted anything that did not form part of the rad tech knowledge base -- as if to say, "If I don't know it, it isn't worth knowing". With time, some rad techs displayed this attitude more and more openly.

On 18 June 1996, Mei, Geber, Utrera, and I returned from an ALARA Working Committee meeting to find a "Dilbert" cartoon taped on the outside of each of our office doors. In the first box of the cartoon, Dogbert "moons" the reader and states the theme: "What you do is not nearly as impressive as what your job title implies that you do". In the second box, a woman asks Dilbert what he does. In the real cartoon, Dilbert replies, "I'm an engineer", but the posted cartoon was altered so that he says, "I'm an ALARA engineer". In the third box, the woman asks, "But what do you actually do?" and Dilbert replies, "I'm on a big, important project". In the fourth box, the woman persists, "Yeah, but what do you do?" and Dilbert says evasively, "Hey, enough about me".

The point of the altered cartoon was to put down rad engineers by implying that they did no significant or value-added work. In light of the many hostile comments we had been getting lately and also because this was not just slipped under one person's door but was publicly posted on all our doors, I sent an E-mail message to Sims reporting the cartoon posting. I reminded him of the recent nasty posting in the ORP Suggestion Box; I stated that Hunt's response to the suggestion was weak and that Mei had tried to persuade Mlekodaj to write a reply to it on the grounds that silence might imply agreement. I pointed out that many of the RSS comments on RPP-310 were hostile and sarcastic and that RSS alleged that AEG knew nothing about field work and so was meddling. I noted that we had made efforts to rise above all the hostility and pettiness, but the cartoon, visible to people outside ORP who passed our doors, was the last straw. I asked Sims to do something about this, not in punishing the culprit but in bringing this to the attention of ORP and speaking out against such low behavior -- I suggested that he and his section heads issue a statement condemning it and I asked for an affirmation that AEG did add value in its work.

All that day, whenever I spoke with any RSS person, I asked that person if he had posted the cartoons; I specifically told him that I was not asking him to rat on anyone else. Later in the day, I happened to speak by phone with Perkins on another matter. I didn't believe anybody at Perkins' level (group leader) would have posted the cartoon, but on impulse I asked him anyway if he had. I was stunned when he admitted to it. I then wrote another E-mail message to Sims (copy to Mei, Hunt, etc.), telling him that Perkins had admitted posting the cartoons. I said that I thought Sims should "consider calling an ORP cease-fire" because of all the hostilities. Sims did not reply to this memo, nor did he ever say anything about this matter to me or to the rest of ORP; I heard nothing from Hunt or anything else from Perkins either. As far as I was ever able to find out, Perkins was not reprimanded or in any other way disciplined for his action.

We urged Mlekodaj to put a defense of AEG in the Suggestion Box and he agreed. Yet no defense appeared. Mei prodded him from time to time, but he put her off. Finally, in Sept 1996, Mei told us that Mlekodaj had postponed the defense for unspecified reasons.

On 9 September 1996, as I noted earlier, Perkins had had his complex leader Davis sign an RWP for AEG without our knowledge. So on 16 September 1996, Mei wrote to Perkins (copy to Hunt, etc.), summarizing a conversation she had had with him earlier that day about it. She noted that the general work area dose rate for the hot job was 10 R/hr, which triggered an RPP-310 Level 2 review that should have been done by me as the AEG rep (and which after the new RPP-310 revision was implemented would be a Level 3 review and still involve AEG). In her memo, she quoted Perkins as having said that he judged that it was an "urgent" job but as having admitted that he had made no effort to get in touch with anyone in AEG before he made this decision. She pointed out that someone from AEG was in at all times that day from 7:00 am on and that if circumstances warranted, the review might even have been handled by telephone. She reminded him that the line manager had responsibility to ensure adequate planning and review of rad jobs and that even if RRD management delegated this to the HFIR rad tech office, RRD still

had the responsibility to plan the job adequately in advance and to call (or have the rad techs call) AEG for a review in a timely manner. She pointed out that Perkins' assigning someone to sign off as AEG reviewer and our not being informed about the job were violations of RPP-310.

But ever inclusive and conciliatory, Mei noted that Perkins had already told her that he was sorry and that he had "made a bad decision" in directing Davis to sign off as AEG reviewer. She quoted him as saying that RRD had not provided accurate information to him about how urgent the job was and as admitting that he "should have remembered that the AEG folks are his peers and he should have consulted with AEG about this matter". Her tone was forgiving, encouraging, and understanding.

The same day, Perkins responded by E-mail to Mei, stating that he agreed with what she said except for her last paragraph. He said that he had "apologized for his decision", but that "I never said I was "sorry" ", asserting that there was a "big difference" between the two things. He said that he told her that she was his peer within ORP (since they were both group leaders), but he did not consider her staff (Geber, Utrera, and me) to be his peers. He stated that he and she had agreed that he would call Mei on any future "urgent" jobs and they would conduct the review over the phone "IF the situation warrants it". Mei forwarded this message to Hunt and Mlekodaj so that they would know what was going on (Perkins had not included even his own supervisor, Hunt, on the distribution).

Note that Perkins responded aggressively and belligerently to Mei's kindly message, even though he was squarely in the wrong about the job and might even be eligible for discipline because of his handling of it (under a different management than Hunt and Sims, of course). She was speaking of "peers" in a technical sense, but he made it clear that he meant peers in a political or power sense. He was also cagey about his commitment to adhering to the procedure, saying he would call her (not me, the designated AEG rep) if a job were urgent and implicitly giving himself the authority to decide if a situation warranted a phone review. At some later date (1997?), Perkins told Mei that he was her customer, in an apparent attempt to put himself in the position of someone to whom she was accountable for her people's performance of reviews, rather than, say, RRD or her ORP management. Mei told me that she did not agree with Perkins' contention that he was her customer and she told him so. However, the procedure comments, the suggestion box statements, Perkins' invocation of supporting RRD as a reason to violate procedure, and his assertion finally that he was the customer all show that RSS was trying to put itself in the driver's seat with respect to others in its own division.

In December 1996, Mei produced a document titled "What Does an AEG Radiological Engineer Do?", I assume for Mlekodaj's use in countering the Suggestion Box statement about RPP-310 reviews. It drew on input from Geber, Utrera, and me. Mei thought that if RSS understood what AEG did, they would be more likely to view rad engineers as part of the team and to cooperate with them in planning rad work. I thought this was a vain effort, since the information was not likely to persuade those whom it was supposed to reach. Mlekodaj did not use it, as far as I could tell.

To return to the Suggestion Box issue, after the "ALARA nightmare" suggestion there was one about rad techs doing gamma spectrometry.

Suggestion: "It was recently brought to my attention that there are RCTs [rad techs] who are qualifying waste using Gamma-spec, and are basically doing engineering work. How can we get this additional training? I don't remember this kind of training being on any of the RCT sign offs."

Hunt: "I only know of a couple of cases where RCTs have had the need to operate a portable gamma spec and one of those did involve characterization of waste (there may be others). I don't think it's common enough to develop a training program for, but if it becomes more common, we can certainly develop something. The gamma spec is just another specialized instrument, and I would expect anyone that has a need to use a specialized instruments would receive some instruction in its use. I wouldn't consider it

"engineering work" -- I operated a ancient gamma spec system (not "portable" by any means) as a junior tech nearly 25 years ago. Some of the rad engineers have experience on the portable spec and have trained some RCTs and would probably do the instructing in the future if the need arises. My guess is we have other instruments that the RCTs would have to train the rad engineers on. If your customers have requested some sort of long-term gamma characterizations, talk to your complex leader, and we can work something out."

Hunt's answer was exasperating. He was implying that the rad engineers had trained the rad techs who had done the characterization of the waste, which was not true. He was saying that there wasn't any formal training program either, so that the training was essentially an informal "I show you how to point and shoot" instruction. He did not imply that any formal training was given in quantification of the waste, although that was part of the gamma spec work; he did not imply that there were any procedures that governed the use of the instrument, much less specify who wrote such procedures. He operated a fixed gamma spec years ago, but it was likely he did it under the supervision of professional health physicists (or they wrote the procedures according to which he presumably used it). He put the usual "rad engineers have no reason to feel superior" spin on things by his gratuitous reference to "instruments the RCTs would have to train the rad engineers on". He said that if "customers" wanted, rad techs could be provided to do this work. There was no reference to getting help and assistance from AEG, to times or conditions when AEG should be doing the work instead of the rad techs, or to how the complex leaders might determine whether requested work was appropriately done by rad techs. Thus Hunt created a parallel arena in which gamma spec'ing done by rad techs rather than rad engineers was a completely alternative choice for RSS and their customers.

AEG-RE Meeting, 9 March 1995

Utrera reported on a conflict between ORNL and the Lockheed Martin Energy Systems (LMES) central organization. An LMES Central functionary came up with some release limits for items contaminated with TRU (transuranics), but Utrera and others explained to him that these were too time-consuming, etc., for practical application. The functionary then said huffily that he might impose a moratorium on ORNL waste disposal (including used toner cartridges). He claimed that the Paducah site was using his frisking limits, but Paducah told Utrera they were not. The functionary's approach was not required by DOE; besides, the LMES Central rad protection manager, Glenn Murphy, required 100% frisk of things from rad areas but 0% from non-rad areas. However, the functionary disputed this and won, since his boss said it was the functionary's call and since Murphy had reportedly decided to "give him enough rope to hang himself" with. This mess highlighted the problem with oversight by LMES central. They were supposed to make policy that applied to all of the Lockheed Martin sites and they were supposed to coordinate the resolution of technical issues common to all sites to ensure consistency. But they often felt that they were ignored by the individual sites and were even lied to, while the sites felt that they knew their own problems and thus the practical solutions better than the central people. The central people acted like quasi-regulators in prescribing, e.g., values to be used without exception; the sites resented being treated like regulatees instead of colleagues. Firm and enlightened leadership by the central top managers could have alleviated this situation, including providing Murphy with a more defined authority, but as I noted earlier, the higher central management's concern was mainly its own self-preservation and the perpetuation of the contract with DOE. Also, higher central management was excessively Y-12-fixated, so issues that were largely irrelevant to Y-12, such as TRU-contaminated materials, were ignored.

Soon after our fetal protection surveyor joined us, she consulted an LMES Central health physicist on a fetal protection issue. She should have been asking Mei or me, since Mei was her supervisor and I was the ORP fetal protection point person. She explained to me that she just wanted the LMES Central person's opinion; perhaps she thought LMES Central was the ultimate authority anyway. I was unfavorably impressed by the LMES Central person's non-answer: he told her he was going on vacation soon and so she should "bang on" him again when he got back. He was telling her, in effect, that he wouldn't take it

upon himself to make a note to get back to her; she would have to remember when he was to be back and then make another attempt to get in touch with him. This made him seem like a prima donna.

Training

As part of the continuing education of rad techs required by the RCM, it had been decided to have a "cross-training" module. I think that this was not intended to be training to enable the trainee to perform any function, but rather "awareness and information" training. One such module involved visits of rad techs to AEG to discuss AEG's workings and functions. In March 1995 I met with rad techs on two occasions as part of this cross-training. Nobody told me what to talk about, except "your work", so I discussed ALARA aspects of work and told the techs what AEG does to carry these out. I believe that Mei met with other groups of techs and perhaps Geber or Utrera did too. After only a small subset of techs had visited AEG, the visits were dropped. Except for this module, I do not believe that the rad techs had any formal or sit-down training in ALARA (other than the "time-distance-shielding" mantra) or any procedure training regarding the AEG-RSS interface.

AEG-RE Meeting, 16 March 1995

Mei said that the Defense Nuclear Facilities Safety Board (DNFSB) had visited ORNL, mainly Building 3019. (This was because DNFSB's scope involved only "defense" facilities and the only ORNL buildings falling in that category were the few that stored or were otherwise involved with U-233 and other fissile isotopes.) DNFSB supposedly gave ORNL rad protection at 3019 an A+, which we AEG-RE members viewed cynically. First, although we were glad that a plaudit was given to ORP through the work of the rad techs -- praise of anyone in our divisional "family" was good for everybody -- we thought it odd that only rad tech activities seemed to be considered. Second, 3019 was run by the Chemical Technology Division ("Chem Tech"), which all of ORP knew from experience did not have the best rad safety practices (see the MSRE section below). It looked as though the DNFSB's look at 3019 had been only superficial and perhaps uninformed.

The 3029 Hot Cell Cleanup Operation

In 1995, a cleanup operation took place in some hot cells in Building 3029. Since DOE wanted work spread around many companies, the contract was given by DOE to a subcontractor. The subcontractor sub-subcontracted to another company. Though I am fuzzy on the details, it was certainly true that the sub-sub was supposed to be cleaning up a particular 3029 hot cell. ORNL itself had no operational role, but DOE nevertheless expected ORNL to provide oversight with minimal or no funding.

The floor of the hot cell was contaminated, but some thought that old contamination under the floor plate was a significant contributor to the dose rate inside the cell. Lead bricks had been put on the floor to decrease the dose rate so that other work could be done. The lead bricks were supposed to be removed one day, when only a sub-sub worker and a sub-sub rad tech were present; the rad tech was supposed to be covering the work, not performing it. But a video camera set up to capture all work done in the hot cell for lessons learned purposes showed that both she and the worker moved the bricks. Furthermore, while they were wearing protective clothing, hers was unzipped most of the way down so she could keep cool. There were other access and contamination control violations.

ORNL rad tech David Craft was uneasy about what seemed to be going on over there day after day and checked up on it even though he was just supposed to receive dose reports or some such. He reported the violations. The powers that be then reviewed the video. In the ensuing investigation, Craft was called a "hero" for his perspicacity by one of the non-ORNL investigators. As a result of the botched operation, part of the east wing of the building was left heavily contaminated. I don't know who had to pay for the extra cleanup, but it was reportedly not complete even in 1996. The rad tech disappeared a few days after the incident; the sub-sub management told investigators that she had gone to Germany on a planned trip (she had family there), but everybody thought that her employer bought her a ticket and told her to go, to

make her unavailable for an interview. The sub-sub claimed that she had been trained as required to ORNL standards, but training records showed otherwise.

There were other fishy aspects of this operation. It was known before the contract was let that the sub-sub was "connected". There was a DOE person who was married to a sub-sub person, whose spouse was in turn married to a subcontractor-associated person...or some incestuous triple relationship like that. The reader should not think that because I can't remember the details, this might be just rumor. The details came out in a big way after the event -- they were known to many people and were widely discussed around ORNL and indeed the whole Oak Ridge area. Everybody saw that DOE had failed to discover and consider the conflicts of interest inherent in its contract choice (or didn't care). So instead of a successful operation done by competent workers, they got an incomplete job and an expensive mess to clean up. Regarding the dispersal of work to multiple small companies in the interest of, I guess, spreading the DOE wealth, I asked my usual question, "How is this better?" and got no answer.

To add insult to injury, DOE tried at first to blame...ORNL! Although ORNL was not supposed to be significantly involved and had no control over the operation, DOE somehow tried to say that since the work was in an ORNL facility, ORNL should somehow have prevented the violations. This did not fly at all with the investigators and ORNL thus "dodged a bullet". But the unfairness of all this and the fecklessness of DOE's involvement from start to finish left a bad taste in people's mouths.

The Spallation Neutron Source (SNS)

The Spallation Neutron Source (SNS) was the allegedly cheaper accelerator facility that replaced the late lamented Advanced Neutron Source reactor facility. Since I had such a strong background in design and I had been the ORP representative on the big ANS design team for years, Mlekodaj and Mei thought that I should be the ORP rep on the SNS design team.

There was to be a series of presentations in May 1995 on SNS by people from the various disciplines that would be represented on the project. Mlekodaj asked me to prepare and present the rad protection one. I wasn't experienced in accelerator rad protection, as Mlekodaj was, but I felt that with my master's degree in physics, my certification in health physics, and my extensive experience in the design of all kinds of facilities, I could do a creditable job on this introductory presentation. I took as my subject the radiological problems presented by the SNS. I posited the issues as if I were telling the design engineers and scientists the questions that a rad protection person would ask or would need to deal with, given the current assumptions about the facility. I dug out accelerator articles from the journal of the Health Physics Society, material from the DOE technical guide for accelerator facilities, and other such sources. I touched on shielding, detectors, potential production of airbornes (by, e.g., vaporization of the target), access control, etc. I had given many talks to professional groups by this point in my career and I thought I had done a good job in providing a reasonable heads-up overview of potential issues to be dealt with. Mlekodaj himself remarked to me that he had not been aware of one of the facts I quoted. (In 2004, I attended a course given at a Health Physics conference by a person who was very experienced in accelerator health physics and I was gratified to hear him making the same points as I had.)

But as SNS was gearing up to start design in 1996, Mei told me that she was to be the AEG rep. I was stunned and asked her why. She would not tell me, but repeated over and over with an insincere smile that she would "give it a try". I pointed out that I had experience in large project design work (as she had not) and that Mike Harrington, the Reactor Operations Review Committee (RORC) chairman who was also working on SNS, had thought I would be the ORP rep. She repeated her "give it a try" statement, complete with smile, and said she might ask for my help during the detailed design phase. I was suspicious, because knowing her as I did, I believed that she would have told me the reason for this replacement if she had been allowed to. I realized that it must have been dictated from above that she should be the rep. I couldn't understand why this would be. Harrington was very surprised a few weeks

later when he called me up to discuss SNS and I had to refer him to Mei. To this day, I have not been able to find out why the change was made.

The Molten Salt Reactor Experiment (MSRE) Project

In April 1995, Mei and I toured the Molten Salt Reactor Experiment (MSRE) facility with Dan Ramey of Chem Tech and Joe Devore of Engineering. Utrera was the MSRE ALARA rep, but he was unavailable and I was the "backup". Chem Tech had charge of this facility and Ramey, a section head, was handling some specialized operations intended to allow characterization of the radioactivity. Devore, with whom I had worked on the ANS project and whom I respected, was there in an engineering support capacity.

MSRE had been built back in the 1960's as an experimental facility to test the use of molten salt as a reactor fuel medium. The uranium was in the form of several salts that were solid below a certain temperature but liquid ("molten") above it. Thus the fuel -- the uranium salts -- could be heated and pumped as a liquid into the reactor when desired and then pumped back into tanks and cooled to a solid when the reactor run was over. In shutdown status, the salts were stored in these tanks. Because residual radioactive decay caused fluorine to dissociate from its salt and collect as a corrosive gas in the tanks, every few years the tanks were heated up to force the fluorine to recombine with and thus be recaptured in the solid salts. There were periodic but not frequent radiological checks done at the facility, mainly by looking at the dose rates at particular points of interest. This had been going on for the many years the facility had been shut down. DOE was apparently content to allow this to continue indefinitely, without decommissioning and decontaminating the facility.

But then something happened that forced action to be taken. There are various explanations as to why it occurred, which the reader can find in various official reports. I don't think the reports are entirely accurate since there was some mutual finger pointing by DOE and Lockheed Martin: DOE said that LM should have known what was happening or even was going to happen and should have maintained the place better, while LM said that they had pointed out the dangers to DOE repeatedly and had been denied money for increased maintenance and cleanup each time they asked. There have been various exposed worker lawsuits that arose out of the problems at MSRE also, which seem to have made LM and DOE leery of being candid. My personal theory may well be incorrect, but I offer it below for what it is worth. (What I say below is factual except where noted. But I left my MSRE files at ORNL when I was laid off, so there may be some minor errors in even the factual stuff.)

In the fall of 1994, a significantly increased dose rate was observed at one point (a valve area, I believe). This was checked by gamma spectroscopy by Mlekodaj himself. During one test, a white powder was seen to be emitted as a poof into the air and it quickly settled out. The white powder is the "signature" of UF_6 gas coming into contact with air, so the conclusion was that the uranium fluoride (UF_6) gas must have migrated to that point. But the UF_6 was not supposed to be there -- it was supposed to be back in the salt tanks and to have gone no farther than an earlier closed valve (i.e., a valve nearer the tanks). Most troubling, it seemed that there was a significant amount of fissile material deposited on the Auxiliary Charcoal Bed (ACB) vent filter, which was basically a large-diameter pipe looped into four main vertical sections in a shielded pit; this filter, mostly filled with charcoal, was "the last stop" for emissions before they were released to the atmosphere.

The original uranium had been mostly U-233, with some U-232 and U-235. Although the U-232 (half-life = 72 years) was present only in small quantities, it was undesirable because it decayed over a period of 5-10 years to a significant level of Tl-208 (thallium-208), which produces a very strong gamma ray (energy = 2.6 MeV). This was what was detected originally and then identified by gamma spectroscopy. Although it was the U-232 that signaled the migration, obviously the bulk of the migrated material would contain the fissile U-233. Much later, it was found that one of the valves near the tanks had failed partly open, which had allowed the UF_6 gas to leak through. The gas traveled down the piping to the next closed

valve, at or near the high dose rate check point. I believe that the failure occurred some years before the discovery of the higher dose rate, probably during one of the heating cycles when the pressure on the about-to-fail valve would be greater. Once the gas eventually stopped at the next closed valve, the U-232 began to decay, taking a few years to show the elevated dose rates from T1-208.

Because of the evident migration, DOE thought that it was possible that a critical mass of fissile U-233 might be present at some point in the piping or the ACB filter and might constitute a criticality hazard. So DOE ordered an immediate evacuation of everyone in the facility. In the usual DOE and ORNL manner, there was never enough money to provide appropriate office space, so there were many people, mostly from the Health Sciences and Research Division (HSRD), who had offices in this old facility. These people were summarily barred from their offices, including from their phones and computers, and HSRD was left to scrounge room for them in the rest of ORNL. Their work was disrupted for a period of time. There was a great deal of bitterness about this among those evicted, because many were radiological specialists themselves and did not think that there was any significant possibility of a criticality.

Meanwhile, a team, mostly from Chem Tech and led by Ramey, mobilized to characterize the facility and try to stabilize the situation. The original facility manager seemed to be increasingly sidelined as time went on. Utrera had too much work to keep the MSRE rad engineering assignment, so Mei decided to give it to me. On 31 July 1995, Mei and Utrera briefed me regarding MSRE and I read some documents on Chem Tech's own recent coolant drain cell gamma spec scanning. That afternoon Mei, Utrera, and I attended a meeting with Jo Ellen Francis, the MSRE-area RSS complex leader; Barry Childs, an MSRE rad tech; and Dr. Jim Rushton, Elvira Hodges, and Ian Gross of Chem Tech. We AEG people expressed reservations about how Gross took the gamma spec data and how he was using it to deduce radionuclide quantities; we pointed out that it was one thing to use the gamma spec method for identifying isotopes and quite another to use it for quantification. Gross did not have much experience in using the gamma spec instrument (the portable "Nomad"): as he told us, he had only recently come back from a course on how to use it. I also pointed out that based on my examination of the documents, the choice of points to scan was likely not a representative set. Rushton, who was now heading up the MSRE project, was obviously irritated at the AEG position and tried to bully us into retreating from it. This meeting occurred the day before a DOE-Washington ES&H assessment visit to MSRE, so it seemed likely that Rushton wanted to have the gamma spec data ready for that, without any dissenting voices. But in the end, they all agreed that Hodges would send us a revised gamma spec work plan.

This was the first time that I had met Rushton, Hodges, and Gross. I believe, from later observations of Rushton, that he was a capable manager; also, he had the interest and ability to keep on top of the technical aspects, a very important quality for a project manager. But as I found here and later, he had an ego "out to there" and he seemed to want to declare that things were so and have people accept that without argument -- he did not seem to think he should have to explain himself. His PhD was in nuclear engineering, I believe, which is the likely reason why he often seemed to disdain rad protection concerns: he knew all about radiation and if he wasn't concerned, why should anyone else be? Hodges was a pleasant, intelligent engineer. She seemed to be listening carefully to what we said, unlike Rushton. In my various dealings with her, she was always cooperative and had a positive attitude toward incorporating safety concerns. So I came to view her as one of the "good eggs" in Chem Tech. Gross was a young hotshot, full of himself. I like to mentor young people and so I pay particular attention to explaining things to them that they might not be aware of yet (as others have kindly done for me). I felt that Gross had a lot on the ball, but he was as arrogant as Rushton. Unfortunately his supervisor and mentor was Ramey, who, as I will illustrate later, was more likely to encourage than discourage "cowboy" behavior.

As AEG rep, I began to attend the regular MSRE Friday planning meetings, which generally included representatives of many disciplines and groups. The meeting of 6 October 1995 was attended by more than two dozen people. There was a discussion of what was known about the migrated material -- the

"deposits" -- and Rushton and others spoke as if it were certain that the U-232 was in "secular equilibrium". (This is a technical concept applying to radioactive decay and expresses what one might call the mature establishment of the decay chain.) I questioned whether the U-232 was in secular equilibrium, as everybody was assuming. The reader should understand that it was very important to establish this, because if the U-232 was not in secular equilibrium, then the Tl-208 was not yet at a maximum. This had two implications: the gamma dose rates would continue to increase to an undetermined degree and the quantification of the uranium content on the basis of the current Tl-208 content could not be done reliably. I was persistent, but only because Rushton, instead of saying, "We'll work it out later" or "We'll discuss it after the meeting", acted as though his mere assertion that this was true settled the matter, again resorting to declaration rather than persuasion.

As I pressed the point, Rushton suddenly lost his temper and shouted at me in front of everyone, "You are technically incorrect and you don't know what you're talking about". Seeing his anger, I instantly subsided; everybody else was startled, but nobody said anything. Two people expressed sympathy to me at the close of the meeting. I reported this to Mei and Mlekodaj. Neither seemed to be surprised (Mei had already seen Rushton in our gamma spec meeting).

On 6 November 1995, I was visited by one of those who had expressed sympathy, Teresa Childs. She told me she was the wife of MSRE rad tech Barry Childs. I had known both of them for several years, but hadn't realized that they were married. Barry and I had had a conversation some time earlier in which he expressed his frustration at Ramey and his minions, including Gross: they were violating rad rules (such as frisking out of contamination areas and notifying the rad tech before entering certain areas) in the interest of operational convenience on a routine basis. Even so, I was surprised when Teresa told me that Barry had been taken off the MSRE project at the behest of MSRE management. She said that Barry had been increasingly stressed in trying to keep an eye on MSRE workers and ensure that the rules were followed and in coping with MSRE management's failure to correct the situation the multiple times he reported the violations. Finally, he had had a confrontation with several workers who had entered a rad-controlled area without informing him, contrary to the posting. But he, not they, was then reassigned.

Barry's reassignment made it look as though he were at fault. So Teresa asked me to intervene with Barry's section head, Hunt. I met with Hunt to ask him to reconsider, pointing out that MSRE's complaint about Barry was that he did not get along with the MSRE craft and operational people, when, as Hunt knew, he was only trying to enforce the rad rules. I also pointed out that his clashes were with Ramey and his people, who were already known to ORP rad techs in other Chem Tech facilities as being chronically noncompliant. Hunt replied that Barry was overly touchy and "had shouted at a craftsman for violating a rad rule when the craftsman was just doing what they [the operational people] told him to". I wondered, but not aloud, why the feelings of a craftsman who was violating his rad training were more important than those of a rad tech who also was "only trying to do his job". I defended Barry by saying that he was understandably frustrated by weeks of this sort of thing. Hunt said that he would indulge the project people "one time", i.e., he would remove someone they objected to once, but if it happened a second time, he would not do so. I reported this conversation to Mei and Mlekodaj.

Note that although it was clear that Ramey et al. were in fact violating rad rules, Hunt nevertheless did not stand by his rad tech. This was very demoralizing to all ORP people. I thought that it was outrageous and a terrible precedent. Hunt and Chem Tech could claim that it was just a personality clash, but Ramey and his subordinates were not removed from the project. Although Ramey et al. may have been lectured by his management (I bet not), no overt corrective measures were applied so far as we could tell. (It is interesting to look ahead another year or two, when another MSRE rad tech remarked to me about Ramey that she "just kept my eye on [Ramey] all the time and then [things are] all right" -- i.e., she did not trust him but kept him under surveillance all the time he was in rad areas, and then he behaved.) This situation was also demoralizing because the violations were being condoned by both O&R and ORP management.

Note most of all that that this was the first of three removals of a safety person from MSRE at MSRE management's request, as I will discuss later. All three removals were at the behest of Chem Tech, who, although Bechtel Jacobs took charge of the facility in about 1998, still ran the facility for them for a long time. I believe that this willingness of ORP to allow Chem Tech to veto safety personnel assignments at MSRE was a factor in the later wholesale abdications of ORP authority to O&R entities.

I thought that the best tack I could take with regard to the rad tech removal problem and Rushton's hostility on the gamma spec and secular equilibrium issues was reconciliation and persuasion, à la Mei. I did an analysis of the U-232 situation at MSRE. I calculated how long it would take to get to 10%, 50%, 90%, 95%, 99%, and 100% secular equilibrium; how long it took for "sec eq" to be restored when the chain was disturbed by removal of an intermediate radon (gaseous) daughter, e.g., by ventilation; how high the dose rates from various shapes of deposited salts on the interiors of pipes (e.g., localized spots vs distributed sources) would be; etc.

I gave a presentation on my data at an MSRE technical meeting in about December 1995. I pointed out that while the deposits were not yet in full secular equilibrium, based on the estimated date of migration they were at about 97% of sec eq at that point. So sec eq could be assumed for deposits dating from that migration. In effect, between Rushton's sureness and my doubt, we could split the difference. I pointed out, though, that if the migration date were later than currently thought, then existing deposits would depart from secular equilibrium to a potentially significant degree. This would be true also for subsequent migrations, e.g., when valves were opened during the decommissioning work. I also pointed out that it was very important to characterize the shape of a deposit if one were trying to quantize it based on close-up measurements (as would be necessary in space-limited areas). This was relevant to gamma spec'ing being done at varying distances and from varying positions. Over the next two years, I used my data myself and supplied them to others. But I wondered why the data hadn't already been generated in the comprehensive and consistent way that I did -- to an experienced rad engineer, it was obviously needed.

Rushton did not attend my presentation, but Brad Patton did. He was another Chem Tech section head working on MSRE. I believe that he reported what I said to Rushton, or perhaps gave him a copy of my handout. (As is my practice for all talks, I had prepared a handout that was not overheads, but an actual writeup or report of what I would be saying.) In an E-mail message on another subject that Rushton sent me later, he seemed to refer to his yelling at me, saying obliquely, "As you may have noticed, I can be unpredictable". He also later referred to my presentation in a brief but complimentary way -- "As Ms. Westbrook has shown...", or some such -- in a memo to a group of people. However, he never apologized directly or explicitly acknowledged the technical merits of my work to me.

During 1996, I worked with MSRE on a regular basis. Since they were doing a lot of novel work, in semi-unknown conditions, much of it had to be reviewed by me, as the AEG rep, under RPP-310. There were also ALARA Plans for some of it. I mostly worked with Bob Kite, an MSRE task leader, on these plans. Bob was a "let's get it done" kind of guy, but he seemed attentive to the safety requirements. I generally have positive interactions with other discipline engineers and this was true even on the MSRE project. Francis, the RSS complex leader, was congenial to work with and the rad techs took their cue from her. The secretaries and the other safety people were cheerful and supportive. So I felt that I was getting along well with the people actually working at the facility.

There were a few jarring notes, however. In May 1996, I learned that there had been a filter change at MSRE and that the DOE rep had asked if an ALARA review was needed for it. (I was surprised and encouraged: DOE facility reps, except for those at HFIR, didn't seem to ask many substantive questions.) Some manager at the facility told him no. But they didn't ask me, although I was the ALARA/rad engineering rep, or even Sims, since RPP interpretation was his responsibility as ORP head. I found this

out about this from Francis or one of her techs, who needed somebody to assure the DOE rep that a smear of the filter was not needed and would not be representative or meaningful anyway. I backed them up, I believe by writing a memo to them or the project people. Still, here was a case where a question arose as to the interpretation of a rad protection procedure and the project people decided it for themselves instead of asking the subject matter experts, ORP. This became a regular feature of MSRE work.

One day in August 1996, I arrived for the regular Friday MSRE technical meeting only to find that it had been cancelled. Such a non-notification had been occurring at least every other month, so I suggested to Richard Faulkner, the new MSRE facility manager, that he should inform people outside the facility in advance about such cancellations so that they would not find out only when they got there. I thought he understood my point: he knew that the round trip from my office to MSRE was at least 20 minutes and could be a lot longer if I were held up at the gate. Faulkner agreed to provide advance notification, but my arriving to find a meeting cancelled happened again and again after that.

In October 1996 I got a call from MSRE saying that MSRE management had a new glovebox they wanted to start using the very next day. Mei and I met with them to discuss it. The MSRE people claimed to have been unaware that at ORNL, new gloveboxes had to be approved before use. They seemed to blame ORP (AEG and the rad techs) for not having told them. I thought that this was rich: implying that we should have intuited when they wanted to start using the glovebox when we weren't aware of their schedule for it, even though it was of course their job to ask, in good time, what reviews and approvals might be needed -- and even though Chem Tech had a long history of using gloveboxes and so supposedly was familiar with all requirements for using them. We safety people explained that there were only two people at ORNL who could approve gloveboxes, John Alexander of ONS (the nuclear safety division) and a person in the Quality division. The Quality person was out, but Alexander agreed by telephone to come the next morning and inspect the glovebox on an "emergency" basis since the MSRE people said they "had to" have it ready that week (apparently as part of a milestone or deadline).

Mei and I attended the glovebox review meeting and the subsequent inspection of the glovebox. We were happy with Alexander's review: he had a prepared list of things to check, he asked substantive, engineering-oriented questions, especially about proposed uses and ventilation, and he considered the actual worker-glovebox configuration and inspected the actual piping. He also brought with him experience of approval of other gloveboxes, so that both the goal of comprehensiveness and the goal of consistency in review were achieved. I cannot emphasize enough to the reader the importance of informed and in-depth reviews of engineered (physical) controls in rad protection, so I am glad to be able to cite this example of how to do it wrong (Chem Tech's late notice) and how to do it right (Alexander's experience and care).

Comments, Comments, Comments, and Technical Bases

One of my principal functions at ORNL was reviewing and commenting on documents. Sometimes it was on behalf of my management, in which case the document came to me from them and I would state to whoever received the comments that I was commenting per management request; other times my comments were "ex officio" in that I was the subject matter expert or designated rep, as with fetal protection or my assigned projects. Often, I got no feedback or acknowledgement of my comments and had no idea if or how my comments were incorporated. Thus there was no true "comment resolution" as was supposed to be the norm. My notes for 1995-1996 highlight the following as problematic.

In July 1995, I reviewed the Bethel Valley Low-Level Waste Upgrade, Bldg 3025, 90% design review documentation. In my comments, I particularly noted the misuse of radiological terms and some dubious statements about soil radionuclide concentration levels. I stated that the designated AEG reviewer (Geber) had not been able to review the 30% design (too little lead time had been allowed) and he wasn't sent the 60% review. So the first AEG review was this 90% one. In response, a project person told me it didn't

matter since the project was being put on hold, which Geber had not been told. I never found out if my recommended changes were made, although they finished this project eventually, I believe.

In October 1996, I was given a draft procedure written by complex leader Pedro Gonzalez (apparently without review by his AEG contact, Utrera) for characterizing bags and miscellaneous solid waste containers. I sent him comments on the procedure, which had significant areas of nonconservatism. The main problem was that he was trying to infer radioactive content from one or two readings on the outer surfaces, using the Microshield program. I did not understand, but tactfully did not ask, why Gonzalez was appointed to produce this document. He was the able supervisor of the salvage rad techs (who did the final rad surveys before items could be released to the public), but he did not appear to have any special expertise in shielding and dose rate calculations and Geber had already noted some overlooked typos in one of the lookup tables in the procedure. Although Gonzalez and I met to go over my comments, I do not think he modified the document at all, since he provided no comment resolution or response (except for correcting the typos). The waste document was apparently put in practice as a technical basis on which measurements and the subsequent deduction of radionuclide content in bags and drums were based.

One-Night Stands

In the first years that I was at ORNL, I was on various project teams and went to project meetings on a regular basis. But from about 1995 on, I or members of my group attended various meetings that seemed to be initial or at least early meetings for projects, and then we never heard back from the project people. Was the project cancelled? Postponed indefinitely? Carrying on without us? It was hard to know.

The main reason for the difference seemed to be that during the Setaro-Mlekodaj-and-early-Mei years, Engineering handled the administration of most design and construction projects. Our group was one of the addressees on a mandatory Engineering distribution list for information about projects and it was thus ensured that we knew what was going on where. But as I said earlier, the O&R divisions hated having Engineering be in control because they thought they could do the design and management of projects themselves and not have to pay Engineering. Besides that, there was some desire to avoid the independent control and scrutiny that Engineering provided. Again, this was an example of how the O&R divisions -- who of course had to pay attention to their increasingly straitened budgets -- wanted to pull all the administrative and control functions into their own organizations.

Engineering tried to placate the O&R divisions in various ways. One way was by setting up a user-friendly group called SHEST (Safety and Health Evaluation and Support Team). The establishment of this group was problematic because as I will discuss later, it provided a path for AEG reviews to be bypassed informally, without revising the rad protection procedures. Another way was to eliminate the mandatory Engineering distribution list. Mei sighed that after the list ceased to be issued, she had to find out informally about new projects; we heard about them from a rad tech, from someone we chatted with at a meeting, from a concerned engineer who called us up, or from an RORC meeting. Or not at all.

One example of a project that seemed to fizzle was the isotopes shipping facility. The existing facility, from which processed and packaged isotopes were shipped out, was old and cramped and its ventilation system was inadequate from a radiological point of view. So it was decided to revamp another building for use as the shipping facility. (In those days, a brand-new building could seldom be built -- DOE seemed to prefer the recycling of old buildings.) Mei and I met with Gonzalez. We agreed that I would do some calculations, but when they were done, Gonzalez did not seem to be interested in receiving the results. I am not sure if the new facility was created or not.

AEG-RE Meeting, 7 June 1995

Mei told us that Mlekodaj himself reviewed the documentation for a third radwaste solidification campaign, not AEG; this was his right according to procedure, but it seemed odd that he would not have

us do it as usual. Mlekodaj signed it, but then asked Mei to look at it, presumably since Mei had seen more of this type of document than Mlekodaj in the last few years. She said the documentation was "not good" -- it contained little dose estimation and seemed to be mostly copied from Campaign #2, itself copied from Campaign #1. The anticipated collective dose was about 4.5 man-rem. Utrera, AEG rep to the campaign project, commented that the subcontractor had problems because its rad techs were not well trained. (Hunt too had alluded to this a few days earlier in the ALARA Working Committee meeting.)

From the statements above, it should be recognized that a subcontractor could come in and do dose-heavy work with its own rad techs who were not trained to ORNL standards. Usually they were supposed to work according to ORNL procedures, which included having their operation reviewed by AEG (when the estimated collective and individual doses exceeded the dose triggers) and having the operation overseen in some nebulous way by our rad techs. But when deficiencies were found, there was little that ORNL had the power to do; we were to "review" and "oversee" but somehow we had no authorization or veto power.

At some point in an earlier campaign, the ALARA program had been consulted about a problem: the casks being filled were lined with giant plastic bags, whose edges which hung over the sides. When a cask was full and was ready to be sealed, a worker had to trim the bag edges off, laboriously, receiving dose all the while from the cask contents. We asked why they didn't just fold the edges back into the cask, which would take seconds instead of minutes -- there was already plastic in the cask, so the trimmed part would add little more, and the plastic was solid, so what difference would it make? Well, they had checked with the Radwaste people and the people at WIPP (the DOE site where the waste was destined to go) to see if folding in the plastic was allowed by the ORNL and DOE sets of waste acceptance criteria, but nobody gave them a straight answer. We urged them to go ahead and fold in the plastic and eventually they did start doing that. But I think they were crossing their fingers and hoping that no one would reject their casks down the line. Here, as so often happened, what seemed to be the obviously optimal solution was clouded with uncertainty by people who wouldn't say a firm yes or no, orally or in writing. So the subcontractor had to choose between saving a lot of dose -- a definite outcome -- and reducing the financial risk -- the potential outcome of being in violation of their contract if the cask were rejected.

Mei told us that Sims had cancelled the consulting contract for the retired Walt Ohnesorge because the company he worked for (a subcontractor who fronted for such retirees) wanted too much money. She told Sims that the fiscal year was nearing its end, that the work needed to be done and the money to be spent; she pointed out that while HSRD might be able to help out, their priority would have to be their existing commitments to NRC and their other projects. But, she told us, we might not have more than 50% of Ohnesorge's time anyway, since Mlekodaj might commandeer the rest for his stuff. This consulting money was said to come out of the AEG budget, so it seemed unfair for Mlekodaj to use Ohnesorge for his non-AEG projects, even his ALARA Program stuff. Again, there seemed to be a lot of fishy financial shuffling going on at ORNL. Divisions would budget their money, saying that they were going to spend so much money on this and so much on that, but mysteriously, there would be informal reallocations. In ORP, although somehow there was a lot of money that "had" to be spent in the "September Jubilee" (as Hunt humorously called the last month of the fiscal year) or else lost as of 1 October, somehow a lot of it did not get spent on budgeted work. Often we found that some of "our" money was used to cover other groups' deficits, yet as Mei emphasized, we supposedly didn't have enough money for ourselves.

AEG-RE Meeting of 13 July 1995

John Alexander of ONS sometimes attended our meetings as the DRCO honcho. A certified health physicist of long experience at ORNL, he expressed reservations about the proposed use by ORNL of plutonium (Pu) in kilogram quantities to make power sources for space use. The external organization proposing the project wanted the processing work to be done in gloveboxes instead of hot cells, which he thought would be a real ALARA problem. The idea was that Chem Tech and the Materials and Ceramics Division would heat the material to oxidize it, break it with a pestle, and make it into pellets. If there was

any Pu-236, there might be serious daughter radioisotope problems. He commented that Los Alamos National Laboratory did some Pu work, but it was hard to get any information from them because they kept it "close to their chests" (presumably in the interests of security).

This project actually did start in pilot form, I believe, in about 2000 -- we heard tidbits about it from time to time before I was laid off and I read about it in several articles in the newspaper after my layoff. However, to my knowledge no AEG person was involved in the planning or review of this project. Mei may have gone to an informational briefing, but I believe that no RPP-310 (operational review) was done even though that was required for a new or unusual operation (not to mention the dose triggers). I cannot imagine any other major DOE site where this type of project would not have had a review by an experienced senior-level professional health physicist or rad engineer (not just a rad tech supervisor, if that). I believe that on this project, the "fix was in" because ORNL wanted it so much and because the project would be done at the REDC (Radiochemical Engineering Development Center) facility, run by Chem Tech. But eventually ORNL lost the production-scale phase of the work to another site.

AEG-RE Meeting of 9 August 1995

We discussed a set of soil release criteria that we thought was not be technically sound. Utrera told the group proposing it that if there was no DOE Order or LMES mandate for it, it should not be used, so they were reevaluating it. Soil release criteria were always controversial since there was no ORNL group that seemed to be "the" designated authority on the subject and DOE had failed to come up with any firm guidance for it. These criteria were not necessarily the volumetric contaminated limits per se, but rather the dose rate or count rate criteria on the basis of which the volumetric content would be inferred. Should the dirt be counted in a clump, spread out _" thick, or what? Was it too conservative to count gross beta-gamma and infer that it was all the most limiting beta emitter, strontium-90? Etc. These things could be worked out by a person skilled in geometrical rad modeling (e.g., a shielding specialist) or by consulting other sites to see how they handled it, but the policy needed to be set by an informed committee, one that adequately represented all groups having an interest in this -- which doesn't seem to have been done.

Regarding another prime contractor's new lead health physicist, Utrera was suspicious of him because he was giving Utrera excuse after excuse to avoid providing a copy of a work plan. Utrera also noted that an ALARA plan was changed after he signed it; an ORNL Radwaste manager caught it and told Utrera about it. The ALARA plan change showed how lightly some groups took such documents and AEG's approval role. Procedure-violating changes like this were never reported as occurrences or called violations under 10 CFR 830 or 835 even though RRP-310 was supposedly part of our RPP. Relationships with our fellow prime contractors were not usually contentious, but ORNL safety people thought -- I believe with justification -- that DOE did not hold other primes to the same standards as LMES.

Mei told us that Ohnesorge would be working for AEG part-time for the rest of the year after all, doing the quarterly report that was Mlekodaj's responsibility to prepare. I.e., after Ohnesorge was said to be out as a subcontractor due to his employer's excessive financial demands, now he was back in, on the dubious grounds that nobody in Mlekodaj's section (including Mlekodaj) had time to do the quarterly report.

The 1995 DOE-ORO Rad Protection Meeting (Oak Ridge, Tennessee, 7 September 1995)

Bob Poe, DOE-ORO ES&Q Assistant Manager, said that DOE realized that it "could not afford to do business as it had in the past" and things had to change. Someone commented that the Oak Ridge sites had lower occurrence reporting limits (set by DOE-ORO) than the DOE regulatory ones and since reporting of occurrences had an impact on award fees, etc., the contractors found themselves planning their programs to avoid having to make occurrence reports. Poe replied that he had been told that this was "outside DOE's control".

Harold Monroe, DOE-ORO Rad Control Manager, noted with satisfaction that the DOE RCM was now a nonmandatory standard. He said that the rad worker training provided by contractors to their employees would "utilize" materials from DOE but would not have to be implemented verbatim, saying that "We pay [you] people to be professionals, so we need to let you do your job". He gave a call to arms, saying that DOE-ORO and the Oak Ridge sites needed to have a publicity campaign to regain visibility within the DOE complex and "allow [scientists] to do their work" (i.e., without being unduly hampered by safety strictures); they needed to publicize the benefits and safety of their work with radioactivity. He said that using the linear no-threshold assumption (LNT, regarding dose effects) had led to "ratcheting down" administrative dose limits, etc.; he claimed that "we" had lost the Advanced Neutron Source and nuclear power and he seemed to ascribe this to the use of LNT. He averred that all this misuse was analogous to saying that being in a 105° tub for 20 minutes per day over many days would produce the same effect as being in a 250° tub for 20 minutes one time. (A DOE-ORO health physicist whispered to me that this analogy failed, because here we would be in the realm of distinguishing between stochastic and non-stochastic effects.) The DOE-ORO regulatory oversight manager commented that Monroe had "taken a lot of hits" from higher DOE management in "his campaign to say the RCM wasn't necessary".

Sims reported that he had received the comment draft of the new DOE Order 440.1 only the day before -- which was the day the comment period ended. (As was typical, DOE-Washington had sent it to DOE-ORO for review and distribution to the local sites -- but DOE-Washington had not allowed much time for comments and then DOE-ORO had sat on it before passing it down.) Sims noted that ORP's budget that fiscal year was \$14M, with \$5M of it from overhead and \$9M from chargeout. There were now 195 people in ORP: 45 subcontractor (temporary) employees; 40 in dosimetry and records (under Thein), 35 in rad controls (rad engineering, source control, procedures, etc., under Mlekodaj), and 120 in radiological surveillance (under Hunt). There were 9 certified health physicists, 27 registered rad techs (NRRPT), 10 PhDs, and 1 registered professional engineer). ORNL's collective dose was running at 40-45 man-rem per year, with the maximum individual dose (TEDE) being 924 mrem in 1994.

J. Jamison, Sims' analogue at the K-25 site, stated that K-25 rad protection had an FY96 budget of \$11M. He had 150 people, with some of them subcontractors. The chargeout rate was \$50.28 per hour (much more than ORP's at the time). He said that if they were to have any salary increases, they needed to reduce the workforce or else increase the chargeout rate by 5%. Dr. Jim Barker, the Y-12 Rad Con Manager, said that Y-12 was still "a large-scale uranium foundry". His budget was \$11.7M for 153 people: 91 in "field operations" (including 24 subcontract workers), 22 in instrumentation, 9 in rad engineering, 20 in dosimetry, and 11 in compliance, training, and RCM implementation. Y-12 had a collective dose of 13.4 man-rem in 1994, with a maximum individual dose of 129 mrem. The outspoken Barker advised his fellow contractors not to deviate much from the RCM and the 835 implementation guidance, based on the following reasoning: 10 CFR 835 was minimal, but not "necessary and sufficient" -- rather, it was just a statement of a "jail and fine" level of protection. Mere "frilly aprons", he said metaphorically, were not "protective clothing", given the intent of 835. Standards (such as the RCM) were also expressions of expectations and the RCM, he thought, was a reasonable expectation of behavior. Not implementing the RCM and 835 meant that the contractor was not meeting expectations and thus would have to defend deviations. In any battle of wills between DOE and the contractor, the contractor would lose. So, he concluded, Monroe's rosy view of the world was not in agreement with real conditions. Monroe got back at him later in the meeting, saying that following a Y-12 shutdown for noncompliances and deficiencies, Barker had made the RCM applicable in order to ward off DNFSB and get restart permission; this was not, Monroe claimed, a long-term solution considering available resources.

MK-Ferguson's Laurie Friedman stated that "it cuts both ways", in that overregulation means fat budgets (for implementation and maintenance). Many contractors would resort to defensive protection from overzealous regulators -- he named one, who, he said, had weird ideas about conduct of operations as applied to health physicists. His organization was "lean": 4 certified health physicists; 57(?) subs, etc.

Their chargeout rate was \$45 per hour. MK-F, recently named a prime, did work on all the three Oak Ridge sites run by Lockheed Martin, so the relationship between the two primes was still being worked out. Steve Meiners of the Paducah site (in Kentucky, but under DOE-ORO) reported that his site also had multiple-prime interface problems. He boasted that he did not even have a copy of the RCM in his office - it was nearly irrelevant thanks to DOE's efforts at RCM relief. Kenny Fleming of the Formerly Utilized Sites Remedial Action Program (FUSRAP) said that multiple partners worked on FUSRAP, on sites in several states, so to ensure consistency among them, they had implemented the RCM through procedures.

Karen Edwards of DOE-ORO's Directives Management Group was introduced by a DOE-ORO official as DOE-ORO's lead in handling/organizing 835 implementation; he said she "does it all". Edwards herself stated that she "came from Personnel [Human Resources]" to her present position and she was "not a health physicist". (I wondered why a non-health physicist would be a lead in handling 835, which was solely on rad protection.) She discussed the Necessary & Sufficient Process (N&S, later called Work Smart Standards) and stated the following. The background for N&S was that "current directives are conflicting, confusing, overlapping"; that directives had "too much detail for One Size Fits All application"; and that there were "uneven" standards policies between different DOE-Washington program organizations. The essential elements of the N&S process were that it "forced careful work planning and hazards analysis"; relied on a "disciplined expert team approach"; allowed the development of additional standards when necessary; and involved production of a set of standards that were to be approved by DOE and incorporated into contracts.

Edwards gave a list of Process Steps in her overheads (the complete statement of one step was this: "Doing"). An expert team was to come up with the set or sets of standards for a particular site or activity. A "Process Leader" was to assemble a planning group to "identify the scope, define the process, agree to protocols, establish teams, and develop needed process documentation". This vague description was particularized by the statement that the planning group would include DOE, contractor management, and "other stakeholders as appropriate". The team(s) that would actually select the standards was to include "subject matter experts". (This sort of loose description went on through all of the Process Steps, but in all of it, there was no explicitness or specification of rad work activities or rad protection.) DOE had to fund compliance and if it did not, it had to provide guidance on what to do instead. The "Process Steps" system was supposed to cover both small and large projects.

There was not a lot of information about performance expectations yet, Edwards continued, so the ideas they had now about it might change by the time that "the Process becomes available for use". The idea was that the contractor would choose the safety standards thought to constitute a "necessary and sufficient" set of standards for operation of the site. She said that no justification or documentation was required for standards not selected; the contractor just had to justify that there was a "complete set". Her handout said that Lockheed Martin would continue to use the N&S process (with the completion of the pilot process) and that approved "S/RIDs" (Standards/Requirements Identification Documents) would cover all Lockheed Martin activities under their contract. On 1 October 1995, S/RIDs would become the (official) contractual basis for ES&H standards, rather than DOE Orders per se. Lockheed Martin planned "to streamline S/RIDs to remove procedural-level details and eliminate requirements that have limited safety value but add cost". Additional "facility-level" S/RIDs were to be developed over time.

Edwards was asked if the N&S process wasn't a lot like the older S/RIDs process; she said that S/RIDs were a "product", while the N&S process was "the way you produced the product". She said that the N&S process had a sliding scale and that a contractor "team researches the standards" to decide which were applicable and appropriate. Someone asked if this was not a way to cause the contractor to "ratchet" himself, especially since the implementation plan might lead to a back-door approach to imposing these requirements -- DOE had to approve the implementation plan and might insist, as a condition of approval, on inclusion of what the contractor deemed to be unnecessary or extra standards. She replied that it was

up to the DOE program office to determine whether a contractor needed to do an N&S process for a particular activity or not. The questioner persisted, saying that that contradicted the practice of some auditors, who demanded that contractors go beyond 835 (e.g., to the RCM level). Edwards said that she had "recommended the use of benchmarks for this". Regarding exemption requests, she suggested that "maybe you can cut a deal". She said that if a site used the N&S process, it was up to the reviewers (auditors) to show why it was inadequate. Edwards also said that ten pilot sites had been selected to "try out" the process; as a pilot, contractors could use the N&S process instead of the RCM and could thus eliminate much of the RCM. In this way, the contractor could plan to get the most bang for the buck. Asked who would tell the DNFSB to back off (if the contractor used this process and the DNFSB found the results inadequate), she claimed that the local DOE-ORO head would tell them.

Howard Wilchins, DOE-EH-Washington, said that the purpose of the "compliance assurance" program was to improve "nuclear safety in the DOE complex". This would be accomplished by having "enhanced management systems" required by P-AAA nuclear safety rules; self-reporting of noncompliances by contractors; and a focus on actual or potentially safety-significant issues. He included 10 CFR 830 (conduct of operations) as being relevant (besides 10 CFR 835). The P-AAA implementation plans were "like business strategic plans": using them, the contractor would prioritize activities for each facility required to come into compliance, schedule completion of the activities, and identify sources of funding for the activities. In short, the plans would "provide a programmatic basis for enforcement". But these "activities, priorities, and schedules" had to be flexible in order to "reflect corporate policy changes and funding changes". The plans were also to be a "source of information" for initial determination when auditors were starting a preliminary investigation. Noncompliances could be identified by contractors themselves, formal DOE reviews (local or Washington), informal evaluations, and outside agencies (such as DNFSB, EPA, or a State). If the contractor did not report a "safety-significant noncompliance", "the Enforcement Staff will not be able to exercise full mitigation discretion". (I.e., as in the NRC world, if a noncompliance was reported by the contractor itself, then fines and penalties would be less and might even be waived.) He emphasized that if a contractor was in compliance with "the four corners" of its RPP or implementation plan, then there would be no compliance issues and DOE or DNFSB findings that could result in P-AAA actions. It was hoped that resolutions of noncompliances could be done in the field, so that few things would have to be brought to the attention of the Washington office. Investigations would not be closed out until independent field verification was done by the local (field) DOE office.

Wilchins also said that when contractors aggressively identified and reported noncompliances, the compliance assurance program could be said to have succeeded. DOE had made a "reverse example" of Hanford, which had reported a noncompliance and was fixing it -- and was therefore not given a notice of violation or fined by DOE. "Everybody has to be involved in what everybody is doing [in DOE]" so as to ensure consistency across the DOE complex. He observed that "If this process works properly, nobody is going to be blindsided by what's going on. If contractors were not comfortable with reporting it as an actual "violation", they could call it a "potential noncompliance". Gregory of ORNL asked what should be done if a noncompliance had no safety significance (in the contractor's view); Wilchins, who did not seem to have considered this before, said that the site should track it and have local DOE kept informed. He concluded that "people have to stay focussed on the aim of this program: to improve nuclear safety".

David Rohrer, acting director of a regional DOE oversight office, said that NRC inspectors don't issue violations, the enforcement staff does; DOE was trying to adopt this system. He quoted the Secretary as saying that only the Office of Oversight handles oversight -- everybody else in DOE does "contract management". He was putting together an inspection staff, but had no certified health physicists yet. He said that all inspectors should eventually be as well trained as people at the sites; a minimum of 20% of inspectors' time was to be spent in training. He told the audience that "You have a professional obligation to tell me if you disagree with me [on a finding] -- otherwise you're a marshmallow." He said there were five inspectors for DOE-ORO. I asked why a cadre of inspectors had been added, when, for example,

there were eight DOE representatives assigned to HFIR alone (as opposed to, e.g., to typically two NRC inspectors per nuclear power plant) -- what functions had been added? He said that the HFIR eight "must be doing other things than the two NRC inspectors do" (or, by inference, than his five inspectors would be doing). He noted that one site found to be noncompliant had contended that they "did not invoke an Order" -- i.e., they had unilaterally decided not to follow an Order, which of course did not fly with DOE.

These speakers then formed a panel. ORNL's Mlekodaj pointed out to them that the RCM was part of the LMES contract on the one hand but a nonmandatory standard on the other hand -- so now what, he asked. Edwards replied that LMES had to submit a change request to take the RCM out of their contract; also, the abolition of old Orders did not mean that a site did not have to reconsider keeping those requirements or not (i.e., it might need to keep some of them under the N&S process). One panelist said that the DOE Order review time was so short because the Secretary had made deadline commitments to the President. An LMES person asked about two prime contractors: suppose they each have an approved RPP and do work on the same site? And if a subcontractor was not in compliance, would the prime be blamed? Wilchins said, "I'm sure that whatever you [two primes] decide will be reasonable and acceptable, if you talk to one another", adding that whether a prime could be blamed depended on circumstances. Edwards said that the N&S-and-enforcement proposal had been "bounced off" DNFSB. DNFSB was uncertain of DOE's ability to carry it off, since DOE did not appear to have enough technically qualified people. Also, DNFSB had "bought into" the S/RIDs, but they were dubious about the N&S process (presumably because the S/RIDs process was not complete, because the N&S process had been adopted so rapidly by DOE, and because of DNFSB's reservations about the proposed DOE inspection staff).

The reader can see from my notes above of this meeting that in just one year DOE moved from having a mandatory RCM, with a required implementation plan, etc., to an RCM that was a "nonmandatory technical standard". DOE also moved from Orders that were in nearly every contract to allowing a contractor to propose what amounted to his own set of Orders, variably supplemented by other standards. More broadly, DOE moved from challenging and detailed compliance requirements, with a help system to aid in implementation, to more contractor-determined compliance requirements, with a new cadre of "inspectors" to monitor them. Arguably, they also moved from rule-based regulation to what one might call judgment-based regulation, although they had contended previously that that was what they wanted to get away from. A key reason for the change was undoubtedly the one advanced by Poe: DOE decided that it couldn't afford a rigorous set of compliance requirements applied broadly over the complex and so had opted for multiple sets that were more flexible and contractor-friendly. Another important reason was the determined opposition of most of the important contractors around the complex, as suggested by Meiners' comment. Both of these reasons were actually two facets of one issue: if the contractors were forced into verbatim compliance with fixed rules, they would negotiate for bigger contractual allocations in order to provide more resources for compliance and to offset the higher risk due to the greater likelihood of being fined for P-AAA violations. While many within DOE seemed to disapprove of DOE-ORO's Monroe for his anti-RCM stance, he did win the approval of many contractors and the RCM did end up being set aside as "only guidance", therefore optional. (I am not sure if his advocacy had anything to do with it.)

Wilchens' statements about the implementation plans for the P-AAA-enforceable rules and programs were significant because he was again telling contractors that since these would provide a basis for enforcement, they should be written and carried out so as to promote flexibility when policy or funding changed. Thus he implied that the basis of enforcement was dependent not on a firm set of requirements and plans for implementing them, but, conceivably, on corporate policy and the money flow. The wishy-washy nature of his remarks was a red flag to all, I believe (or perhaps it was a white flag, denoting DOE surrender to expediency). The "carrot" of penalty reduction for self-reporting was a good idea, as NRC experience had shown; unfortunately, there was also the idea that if the contractor worded his RPP or implementation plan carefully enough to get DOE approval and followed it, nothing that DOE or DNFSB subsequently observed -- however much it departed from generally accepted good safety practices --

could be taken as a finding. This may not have been what Wilchens intended to imply, but it was certainly a logical next step from what he said. All this implied encouragement by DOE of a degree of calculation and even scheming by the contractor that seemed inconsistent with firm, steady, and objective safety regulation and good safety judgment.

Rohrer's statement that, in effect, there were two kinds of people in DOE (or at least in field DOE offices) -- oversight people and contract managers -- was remarkable. This comment presaged a way of thinking that did not foster safety. Also remarkable was Rohrer's inability to answer my question about why HFIR alone had eight DOE field reps (not to mention all the field reps for the rest of ORNL and for Y-12 and K-25) and now DOE-ORO was proposing to add an "inspection" force of five for, apparently, broad safety inspections. Checking for noncompliances and violations had always been part of (perhaps the most important part of) a field rep's job. Also, the reader will recall that I pointed out to DOE-Washington people at a meeting that it would help safety if the field reps spent more time actually in the field. This would include, e.g., attending project design and planning meetings as well as, e.g., checking conditions at the work site. However, the inspectors would perform only the latter type of function and moreover, would look only at compliance issues and not make safety judgments. Thus I thought that DOE, as typified here by Rohrer, failed to get the point: the inspectors might not be wasted, but their inspections alone were not enough to ensure safety and they might be duplicating some of the work that the field reps were supposed to do. (I am doubtful that this inspection force was ever deployed as planned.)

Edwards impressed me as being a pleasant and capable person. But she clearly was a personnel person, not a technical or project management person, so what was she doing presenting the details of a complicated safety management change? It seemed to me that she had been recruited because of her touchy-feely talent and not for any rad management savvy she brought to the task. Second, the safety standard process was garbled and indeterminate as she described it; I had the impression that she had put together the presentation from what DOE-Washington had provided or stated (or might have obtained it "canned") and she might not really have understood it herself. Because it was laid out in neat visual frames and expressed with catchy keywords, some people might have thought there was substance there. But this was the sort of vague and buzzword-heavy presentation that different people heard different things in, therefore it was worthless as guidance or even as useful suggestion. Finally, her remarks showed up the confusion that tailor-making sets of requirements would present: DOE was saying that if something was required by your contract (e.g., the RCM), it continued to be required for you even if it was not required for the rest of the DOE complex, e.g., even if it had been cancelled. The bottom line seemed to be, again, that to protect your site against enforcement actions, you should go for the minimum or the least constrictive requirements you could get away with. This was a lesson not lost on ORNL.

The 1995 Model Conference (Oak Ridge, Tennessee, 17-18 October 1995)

I attended the so-called Model Conference, which was partly supported by DOE. During Q&A after a presentation by DOE-ORO's Gary Riner, I asked about a proposed project's dose limits and the RCM. His reply was that "the contractor [Lockheed Martin] overimplements". I cited several dose and dose rate numbers to illustrate the difficulty and show it was not a problem of LM's making but of DOE's lack of guidance, but Riner replied, "I'm not going to get into it with you". I shut up. The next day, I sent him an E-mail message explaining the numbers and their origins. He never replied to it. I had never seen or spoken to Riner before this and I thought I had somehow ticked him off. But at a subsequent meeting, he greeted me cheerfully by name and in all subsequent interactions, he acted as though he respected my expertise. He turned out to be a savvy and conscientious project manager and I revised my first impression of him. (I would later quip that DOE should clone him because I liked the way he dug into technical material and asked hard and informed questions.) I suspect, therefore, that at this conference he was just uttering the party line and was taken aback when someone questioned it.

REDC (the Radiochemical Engineering Development Center)

REDC was the Chem Tech facility in which targets irradiated in the HFIR reactor were processed to extract fermium, berkelium, californium, and einsteinium and to make sources for researchers. It was the premier ORNL facility for getting dose: usually the great majority of the top fifteen dose-getters worked at REDC and it received a third or more of ORNL's collective dose. One would think that this would be a primo facility for ALARA and rad engineering coverage, would one not? But one would be wrong.

I had had occasion to meet a few years earlier with Joe Richter, who was then the REDC rad protection complex leader. He seemed cooperative, although rather tired and resigned. But when he retired and Gary Kelly took over as complex leader, AEG was excluded almost completely. We could have inferred that this would be the case from the much-discussed speech that Kelly gave at Richter's retirement party. Kelly praised Richter by declaring that "all your book learning, all your certificates can't compare to what this man knows!" He went on in this vein for several minutes, repetitively putting down people with degrees and certifications and raising eyebrows with his vehemence. Geber had Kelly's number immediately with that speech, but I was slower to see it as Kelly's principal point of view. I viewed the speech as a commendable although over-the-top expression of loyalty to Richter, but eventually the evidence of Kelly's apparently complete contempt for any knowledge but field knowledge (and ORNL field knowledge at that) persuaded even me that Kelly was an extremist. So I was surprised when Kelly told me, much later, that he himself had a bachelor's degree.

In November 1995, I met with Hal Butler (retired from ORP and now a consultant) and some folks from REDC to discuss a glovebox shield. Although I was supposed to be the AEG rep to REDC, in fact I was not covering it because Mlekodaj had assigned Butler to do a months-long ALARA evaluation of REDC. I understood that Butler was the real ALARA rep and REDC appeared to think so as well. That is, although REDC was ignoring RPP-310 and its review provisions anyway, they also viewed Butler as "the" ORP professional contact and did not consult me on anything unless Butler invited me. So I was excluded from REDC work and had no way of knowing what was going on at REDC until this meeting, which I think I was asked to attend in case any shielding calculations needed to be done by ORP.

The O&R divisions wanted to do their own designs, including making decisions about how much shielding was adequate. At a subsequent December 1995 AEG-RE meeting, Butler told us that the REDC shield cost came to \$3700 per man-rem, based on information from Chris Parks (of the Analytical Chemistry Division personnel at REDC). Butler said that Parks thought that the dose rate was usually only 4 or 5 mrem/hr if the glovebox was unshielded, although it could get up to 1 rem/hr on rare occasions. The shield cost per man-rem was supposed to be compared to ORNL's approved values of (a) \$1000/man-rem for dose to infrequently or insignificantly exposed workers and members of the public and (b) \$10,000/man-rem for workers who were or might be approaching the administrative control limits. The latter figure would apply to the glovebox worker(s), but REDC apparently did not agree. I am not sure if Butler pointed this out to them, but from his former position at ORNL he certainly knew that ORNL had these dollar per man-rem values. Regarding the 1 rem/hr, the shielding was supposed to take into account the higher dose rate, at least by estimating the additional annual dose it would provide, but this was apparently not done. I don't know if they installed this shield or not, but they didn't optimize it. Also, according to RPP-128 (the rad design review procedure), the design was supposed to be formally reviewed by someone designated by the RCS head, i.e., Mlekodaj. This apparently was Butler, but he didn't seem to be doing the review on a formal basis -- I don't think he wrote a review report, but only a later summary report of his overall ALARA review of REDC. So clearly REDC, in doing the design process themselves, were not doing it according to ORNL procedures and good health physics practice. I discussed this with Mei, but she intimated that it was out of her hands, since it was between Mlekodaj and Butler. I think that Butler did conscientiously the ALARA study he had been commissioned to do, but he seemed to accept too readily REDC's protestations of things being too expensive or not practical.

In mid-1996, I was asked to look at an elevated background at REDC's Building 7920. Kelly was supposed to call me at an agreed-on time to discuss this, but did not. We eventually spoke after I had tried perhaps twice more to reach him. I finally realized that Kelly was not going to cooperate and I would have to dig out every bit of information myself. Because of his attitude and unwillingness to deal with technical issues, I was not surprised when Mei later reported that Kelly said he didn't want to pull REDC neutron dosimeters "too frequently". She said he thought that doses were lower than predicted from the dosimeters (because it was difficult to get the neutron calibration factors right and they were thus conservatively chosen); however, he didn't want to produce "inches of paperwork" documenting it. This was troubling because the neutron doses to the most exposed REDC people were not negligible and it was important to know what these doses were. Also, the neutron spectrum in some areas was hard and in others soft, so determining the correct dosimeter calibration factor for each area was important, as our external dosimetrists said. Kelly told me that REDC didn't use self-reading neutron dosimeters any more because they were expensive and "too much trouble"; they just used gamma self-reading dosimeters and a single neutron-gamma equivalence conversion factor. This was disturbing, again because of the spectrum variation with area -- the equivalence factor would vary as well and anyway it wasn't clear to me that the one they were using was conservative. (So often at ORNL, a correction factor or setpoint once determined was used forever, no matter how the work changed.) But as Mei and I had come to realize, Kelly thought we had nothing to add and he was determined to keep us out of REDC business.

At the November 1995 meeting at REDC, I met an REDC rad tech named J. Keith Waggoner. Waggoner had a degree and had been a high school science teacher. Then he had decided to go into rad protection and got work as a rad tech. He was conscientious and once in a while would call to tell me tidbits about what was going on out at REDC. I believe that what he told me was true, although perhaps sometimes he was not at liberty to tell me all the details. He would later get his master's degree, for which he would do some advanced shielding calculations -- and then remain a rad tech. I always thought he was the best candidate from RSS to become a rad engineer if a position ever opened up. I praised an article he had written for the ORP newsletter about a cleanup of alpha-emitter leakage in and around an REDC building in 1995 and I encouraged him to give a talk on this at the 1996 annual meeting of the Health Physics Society. He did so, and his talk was well received. He asked me for some technical information from time to time. I thought, from these requests, that if this rad tech -- technically superior to most or all of his fellow techs -- didn't have ready access to this information, probably most of them didn't either. This was another reason why I found it surprising and alarming in later years that rad techs and their supervisors were being given so much responsibility that seemed to require this kind of information.

AEG-RE Meeting of 9 November 1995

Mei told us that our section (RCS) was paying for Butler's and Ohnesorge's consulting time. Thus ORP was paying for Butler's work on the REDC glovebox shield, not Chem Tech. But this was clearly a special project and per the rules, should have been charged out. As I noted earlier, after spending some man-hours on two tasks I was prevailed upon by Mei to give him, Ohnesorge had to give them up because of work assigned to him by Mlekodaj. I felt that our budget was being used for these special projects in an ineffective way and in the case of REDC, it was providing cover for activities that were not in accordance with procedure or good practice.

RORC Work

In late 1995, I participated in RORC's 1995 review of RRD reactors. However, on 9 February 1996 I found myself commenting on the 1994 draft RORC annual review report -- which was still not issued after many months, for reasons unclear to me. In September 1996, R. Mike Harrington, RORC chairman, wrote to Mei to express appreciation for my service on the RORC; he did so because each member's management had to approve continued service on the committee, due to the time it took away from regular duties. He stated that I had performed at a high level throughout my tenure on the committee (five years at this point) and that I had been "a valuable member". He said "(she) contributes to each and every

review a thorough preparation and a keen appreciation of and demand for meaningful evaluations" and that "she has frequently been able to help [RRD] representatives see how their analyses or evaluations could be made clearer and more meaningful". I especially liked the part about wanting "meaningful evaluations", since having documentation with "meat" in it was one of my particular aims.

Another Instance of Being "Unclear on the Concept"

In December 1995, I attended a so-called "ALARA briefing" at the Bulk Shielding Reactor office, in the course of which I had to attempt a little re-education. The job was the opening of a B-25 box containing material contaminated with an estimated total of 61 Ci of strontium-90 and reading 80 mrem/hr at contact on the outside. The purpose of opening this very large metal box was to verify the isotopic content. The task leader apparently intended this briefing to be an information session, but some people attending -- including the craft supervisor -- referred to it as the "prejob briefing". I had to point out that this could not be the prejob briefing: the prejob briefing was not supposed to be the first time the workers were hearing any of the information (except possibly for some minor "to be determined" stuff). A prejob briefing is supposed to be a review of all conditions to be faced, methods to be used, and controls to be applied. That is, the workers should already have gone over the methods in detail with their supervisor(s), should already have received any formal or informal training on the methods and controls, etc. A prejob briefing is not the time to hash out major steps in the work procedure, to decide on rad controls, etc., nor is it the time for the AEG rep to perform the review, since the rep's comments are supposed to be resolved with O&R management and the work procedure changed if necessary. The prejob briefing would thus properly take place after the last major change in the work procedure. The craft supervisor and his people had been through prejob planning sessions and prejob briefings many times and supposedly knew the difference. So although I was glad to see that the task leader was clear on the concept, I was disturbed by the fact that the craft supervisor was not.

AEG-RE Meeting, 26 February 1996

Mei reported on a recent RH-TRU treatment workshop. (RH-TRU is remote-handled transuranic waste, i.e., a relatively "hot" type of waste.) It was said that on one DOE-EM project, ORNL could not show it could complete the job in the time and there were too many ORNL parties involved in the project. The ORNL ES&H assistant head, Frank Kornegay, did not want ORNL to provide services such as dosimetry if this was really a DOE-vendor contract, i.e., one that excluded ORNL as a party to the contract, supposedly because of potential liability issues. Kornegay also preferred not to have project-treated waste returned to ORNL because ORNL wanted to maintain its research capability and be known as a research establishment, not handle waste on a routine basis and be known most prominently as a cleanup site. Kornegay did not even want ORNL to read and comment on the technical aspects of the vendor's proposal. A Chem Tech person expressed the concern that there would be a weakening of ORNL's opportunities for R&D if DOE used "service providers" (for which read "other prime contractors").

As can be seen from this, DOE's push to have multiple prime contractors and many subcontractors, without defining the terms of the interfaces between them, made it difficult for both the contractor(s) who ran the sites and for the new companies trying to do work there. Responsibilities and reimbursability in particular were blurred. One example was MK-Ferguson's contracting for dosimetry services from ORNL. They paid the going rate to ORNL, but, we were told, they tacked on their 30+% markup when they charged the dosimetry against their DOE-supplied contract money, as if they themselves were providing the service or as if ORNL were some private company and not a DOE site whose dosimetry equipment was owned by DOE. The ORNL dosimetry people charged out this portion of their time to MK-F and not to the ORNL budget, but DOE's payment to MK-F included all of the dosimetry management and administration services. So although MK-F handed out and collected the dosimeters from its people and their health physicists went over the dose reports, they had no overhead burden from, e.g., calibrating the readers and overseeing dosimeter validations -- yet they were in effect passing this charge on, with their markup, to DOE. DOE was thus paying a lot more for this service than it would

have if Lockheed Martin been doing the cleanup job and handled the dosimetry charging internally, or if MK-F had been doing the cleanup job but DOE contracted directly with LM for the dosimetry services.

Also, Utrera said that a rad tech complex leader told him that a spent nuclear fuel job had started even though the ALARA plan was not signed off yet. This was a violation of RPP-310, but as usual this was not reported as an irregular event (via the Radiological Event Reports that RSS issued), much less as an occurrence. Utrera did not seem to be perturbed by this sort of thing, but just shrugged. If it had happened to Geber or me, we would have expressed our displeasure and concern to Mei emphatically and urged her to speak to the project people (since Sims seemed at that time to prefer that our supervisor deal with notable problems with the O&R divisions, not we). Mei would have expressed regret to us and then communicated with the project people; they would have told her they were sorry, "mistakes were made", it wouldn't happen again, etc. Then we would all have calmed down -- until the next time. So maybe Utrera's approach was less stressful.

Out-of-Tank Evaporator Project

Utrera was the AEG rep for the Out-of-Tank Evaporator Project, which involved volume reduction of radioactive liquid wastes by a subcontractor. Once the project "went hot" and there were measurable dose rates, some shielding calculations needed to be done for the various components and piping -- oddly, this hadn't been done before the project started even though the waste had supposedly been characterized. Utrera did not have time and did not know how to do the calculations with a more geometrically complex program than Microshield, so I began to do them in early 1996. I used the shielding program QAD, after we went to the job site to check the geometry and had the subcontractor take measurements. After I had set up the basic computer model, I showed Utrera how to modify the geometry so that he could run future cases. We ended up getting a nice "attaboy" certificate from the project for our help: a project person said of our calculations that as a result, the project "had to do very little to modify the shielding".

ORP Safety Meeting, 15 March 1996

Sims told us the following. ORP direct charges to customers were mainly by RSS (i.e., by rad techs assigned more or less permanently to the facilities) on an as-used basis. Of ORP's part of Lab overhead (which, the reader should recall, was essentially a tax on O&R to fund support activities), 19% went to RCS (the rad controls section, including AEG), 22% to RSS (the rad techs section), and 59% to the dosimetry and records section. In FY '94 the ORP budget was \$5.4M; in FY '95 \$5.3M; in FY '96 \$5.0M (as of October 1995) and then \$4.8M (as of the not-yet-approved February 1996 budget revision); and in '97 a projected \$4.5M. The number of personnel had gone from 50 exempt, 97 non-exempt, and 46 subcontractors on 1 June 1995 to 48 exempt, 96 non-exempt, and 39 subcontractors on 1 March 1996. A recent, controversial Ernst & Young study took \$650,000 of Lab overhead; results were not in, but the similar Mackenzie and Associates study of PNNL (run by Battelle) was followed by the layoff of many.

These bad-news reports about the budget were delivered periodically throughout the year. Usually the budget was down, but even when it was the same, it didn't keep up with inflation. Still, it was best to know the worst, such as that the Ernst & Young study, widely regarded around ORNL as a big waste, had cost so much. It was surprising that RSS (the rad tech section) took so much overhead, since most of RSS was the rad techs and they supposedly mostly charged out. I was told on various occasions, by various managers or supervisors, that the rad tech chargeout included a surcharge to support the rad tech supervisors, about 13 in number (not including Hunt), so the rad tech supervisor costs were not supposed to include much overhead. Hence it was hard to tell where the money was going. Presumably some of it went for ORP's own detectors (the O&R divisions bought those used by the rad techs for their work), for RSS procedure maintenance, etc. RCS (the rad controls section) had more than 13 people working for Mlekodaj and their work included ALARA program staffing, rad engineering (including RPP-310 and RPP-128 reviews), the source control program, computer support (including maintenance of the ORP computer network and rad protection procedures), and instrument calibration.

AEG-RE Meeting, 15 March 1996

Mei said that there was a "problem" of people trying to get in touch with us regarding ALARA reviews, but she did not elaborate or provide examples. She suggested that we would all get pagers. She asked us to give her information on 1995 projects for an ALARA Steering Committee meeting, focussing on AEG and ORP support of jobs and on how dose was saved.

We immediately recognized Mei's report of people having trouble getting in touch with us as a canard. There had been one incident in which a rad tech from HFIR had called me to come over immediately and do a review so that a nonemergency job could start that morning. When I remonstrated with him, he said that the techs had learned of this job only on the night shift, so they had little more notice than we did. My thought was that it was arrogant of RRD to expect me (or anybody) to drop everything I had planned to do that morning -- including commitments to other O&R divisions -- and run over there to accommodate them. My old boss, Setaro, had a saying that captured the spirit of what I wished I could say to RRD: "A failure to plan on your part does not constitute an emergency on my part". It was also arrogant of them to assume, in effect, that they would get a "no findings" review that would not hold up the start of the job. But still I did get right over there to do the review, as I knew my management would want me to. Mei knew all this, of course, but she was at pains to avoid even the appearance that we were hard to reach; a complaint, even an unfounded complaint, had to be responded to. I think the pager idea had come from above her: it could be cited by the higher-ups as a way that AEG had become "more responsive". I resisted wearing a pager since I thought, correctly, that I would be paged so seldom that the cost could not be justified. But eventually Mlekodaj ordered me to carry one. As experience later showed, I was paged only three or four times a year.

Tower Shielding Facility Lune (Control) Plate Removal Project

I do not want to give the impression that all ORNL projects involved slipshod planning, an operational management trying to avoid safety reviews, and uncooperative RSS techs. Here is an example of an RRD operation that was carefully planned and went off essentially without a hitch. In March 1996, I began to attend meetings regarding the removal and cutting up of the Tower Shielding (Reactor) Facility "lune plate" (the assembly was also referred to as the "control ball" since it controlled criticality). Mei went with me to a couple of meetings on this novel project. Because of the project's unusual and challenging features, having everybody pull together was very important for dose control.

At the first meeting, Bill Hill of RRD and Eric Daggett of RSS were present. Daggett was not popular with some of his fellow rad techs because he was viewed as a "hot dog" -- he was working on his bachelor's degree and was always interested in making sure he really understood a situation. Some other rad techs seemed to think he didn't know his place and some just thought he tried to make too much out of a job. But I liked working with him, on this and on other projects, because he was very alert to unusual aspects of the work, tried to anticipate what others would need to know, and treated us as though we were all members of the same team. He was particularly helpful in supporting us as Hill and I discussed the ALARA Plan, because a vague, detail-light plan would not do for a hands-on, closeup operation like this. Hill was one of those serious, capable task leaders that RRD seemed always to have in those days. He wasn't rude, but in his quiet way he implied to us that he didn't see the point of AEG involvement. Still, he allowed us our "place at the table". Later, since this was a cleanup-class project, a manager from the cleanup contractor came on board, Mary Krempasky. She was smart and kept pushing for results and answers without seeming to tick people off. From the start she treated everybody as members of the team.

The control ball looked like a metal sphere on a long metal stalk, with the sphere being about two feet in diameter and the stalk being several feet long. The stalk was too long for the whole thing to fit into the planned waste container (a drum) so it was decided that the stalk would be cut off before the ball was put into the container. This part of the operation was to take place in a plastic tent, due to the potential for

significant contamination. The control ball was in a pit outside the reactor facility and the operation would take place at a hot time of year, so the workers would be wearing protective clothing inside the tent and would be sweating. Thus a quick snip of the stalk was preferred to sawing, especially since sawing would have dispersed contamination in airborne form. The workers would be close to the "hot" ball, so minimization of time was an issue also. The planners decided that a hydraulic cutter fit the bill and that due to cost and schedule limitations, they would use the one such cutter at ORNL: the "Jaws of Life" owned by the ORNL Fire Department. I was leery about this because I was concerned about cleaning up the cutter afterwards -- it was expensive and could not be junked if contaminated. It had to go back clean to the fire people. But Hill, Daggett, and the operator who would make the cut were sure that the steel blades could be easily decontaminated. Also, the hydraulic lines into the tent would be sleeved in plastic and the main part of the hydraulic apparatus would be outside the tent.

In order to assure that everything would go well, a dry run was performed that was fairly faithful to the actual situation, unlike dry runs on some other projects. Difficulties were discovered and taken care of, but it was decided to do another dry run as a precaution. This was a success, so the operation then went forward. Daggett, the operator, and a third worker were hot and sweaty when they were done but, as the elapsed time record and the video showed, the operation was efficiently and successfully performed.

Holifield HRIBF (Accelerator)

The Holifield HRIBF was an example of a facility doing its own thing, safetywise, and ignoring what it didn't want to do or didn't view as being of value -- and being allowed to get away with it by ORNL management and DOE. I don't think that that is too strong a statement, considering events that stretched from 14 May 1996, when Mei and I visited the facility, to 2001, when there was an event there in which graduate students received unanticipated dose (and which I will relate later).

DOE had in some past year discontinued support of HRIBF (run by the Physics Division) as a radioactive ion research facility, but fortunately it had enjoyed new life as a nonradioactive ion facility. At the time we visited, however, it was being prepared to go back to use as a radioactive ion facility -- to "go hot" again -- so the graduate students and the resident professional staff were being retrained and were doing dry runs. We were shown around part of the facility by the facility director, the late Dr. Jerry Garrett, an affable man who was a "name" in his field, and one of his deputies. We were shown some other parts by Gonzalez, the HRIBF complex leader. With all of these people, we discussed the new rad work to be done and the requirements applicable to it, including the design review requirements of RPP-128 and the operational review requirements of RPP-310. Thus although Garrett died within a year after we visited, his deputy who was with us, others we spoke to, and Gonzalez knew about these RPP requirements. But the RPP-128 and RPP-310 reviews were not done. The facility "went hot" in the summer of 1996.

Extremity Dose

In May 1996, Mlekodaj, Hunt, Mei, and Utrera, and I met to discuss extremity dose. For once, AEG and RSS seemed to be on the same page. Hunt said he thought DOE would expect ALARA treatment of extremity dose. (DOE had said so explicitly and that there was a special DOE notice of a relevant case at Hanford.) Hunt reported that samples from a hydrofracture project were reading up to 1 R/hr and that with the 2026 hot cells down for repair, the Chemical and Analytical Sciences Division (CASD, formerly the Analytical Chemistry Division) was processing the samples in a glovebox. So far, a CASD technician had received 23 rem to the hand and could be receiving additional hand dose at the rate of 1 rem/month. Mei noted that the next year's work was expected to be even heavier. Mlekodaj said that a CASD manager he spoke with had a cavalier attitude about this and claimed that nothing could be done to reduce the dose; in fact, it was the technician himself who asked for his ring dosimeter to be processed. Mei proposed three trigger levels for extremities: investigation, administrative, and high administrative approval; Hunt said he would be happy with even an investigation level. He had recommended that CASD file an occurrence report for the exposure, but CASD chose not to. It was agreed that AEG would now look at the operation.

Mei said that complex leader Kelly of REDC (where both CASD and Chem Tech did work) said that now and then REDC had extremity doses of 1 rem or more, but neutron extremity doses were hard to measure.

Note that ORNL did not have a set of dose trigger levels for investigation of significant or potentially significant extremity doses received, nor did RPP-310 have an extremity dose trigger for a rad review. Also, since the division in whose facility an occurrence took place was responsible for writing and submitting the occurrence report, it could stonewall a safety organization like ORNL by disagreeing that a report was called for. This was true even where experienced safety people like Mlekodaj and Hunt could point to an analogous occurrence somewhere else that DOE had already found adversely notable. The CASD person's attitude of "We're fine, thanks" may not have arisen so much from a cavalier attitude as from the need for a division with money troubles, as I think CASD was, to process the samples in a timely manner and keep their contract. One could sympathize with that, but their deviating from normal practice by using the glovebox and then going so far in giving dose before the higher-level rad protection scrutiny kicked in (and on an informal basis at that) showed that they put operational needs first.

In December 1996, Geber wrote a memo to Mei to say that his investigation into a different high extremity dose showed that the subject did not use sufficient shielding in manual processing of Re-188. Geber pointed out that during a review of an earlier experiment with Re-188 in June, he had recommended extra shielding but this recommendation was not adopted, although other recommendations were. Now shielding and an automatic processing pump would be used. Note that this is an example of a rad engineer anticipating a problem and warning the O&R people, but being ignored. The O&R people, after seeing the actual doses, then took his advice. Had he had approval authority over the measures selected, the correct measures would have been in place from the start.

10 CFR 835 Compliance Issues: Work Smart (N&S) Standards

In July 1996, an exit briefing was given by an audit team (mostly a safety peer group from other DOE facilities) to ORNL management regarding the just-concluded ESH&Q Integrated Management Assessment of ORP. One concern was that "The pending LMER [Lockheed Martin Energy Research] contract renewal and ORNL reengineering activities will present challenges in the timing of and activity level required to transition from a program based on 10 CFR 835 and the Rad Con Manual to a program based on 10 CFR 835 and Work Smart Standards. Ongoing plans for staffing reductions will compete with the availability of resources for one-time activities to [revise] manuals, LMER procedures (including Radiation Protection Procedures), ORP standard operating procedures, etc." Another concern was that radiation instruments were almost always purchased "using customer (project) funds", which limited ORP's ability to make instrument upgrades or obtain special instruments. Yet another concern was that "Safety and Health [OSHP] requirements are not always reviewed/provided to ORP field personnel, resulting in compromised personal protection". One finding was that a sample of ORP procedure manuals contained out-of-date procedures and other inaccuracies; another was that contrary to ORNL procedures, rad worker training not approved by the ORNL central training authority was being provided to some ORNL workers. One proficiency, though, was that "ORP has obtained DOE buy-in on the ORNL [RPPs] by including them [DOE] in the procedural review and in the 10 CFR 835 verification process".

As far as I knew, we safety peons hadn't received any information about how we were going to transition from 835 and the RCM to 835 and Work Smart Standards, or what the implications would be. The audit team report seemed to indicate that the ORNL higher-ups were discussing the process but hadn't involved the people who would have to carry out the provisions on a day-to-day basis. The same thing goes for the statement about "ongoing plans for personnel reduction", which, if ORP people were included, hadn't been mentioned to us before except in the context of letting go more of the temporary rad techs. The statement about the outdated procedures is very relevant to the Health Division Audit, which I discuss below. The statement about the OSHP requirements indicated to me that OSHP was having the same problems that AEG was -- and that this seasoned audit team recognized that as a deficiency.

One implication of the proficiency statement interested me. There had been only a few slight comments from DOE-ORO's safety rep Mark Robinson on the rad protection procedures. The Rad Protection Plan required by 835 was supposed to be approved by DOE-Washington and the procedures were part of ORNL's Plan. If local DOE people had reviewed the procedures and told DOE-Washington they were okay, then the latter might feel that they didn't need to review them also. Thus only local DOE might ever review the procedures and, for reasons that will become clear in future chapters, that was alarming to me.

The statement about rad training illustrated a weakness of control of safety training at ORNL and a deepening deference to O&R divisions by the safety organizations. When ES&H was under one head, Swanks, the ES&H training organization did all the safety training for ORNL except for facility-specific stuff. Then, as I stated earlier, Lockheed Martin's desire to keep the contracts for all three Oak Ridge sites led it to centralize everything as much as possible -- including most of the safety training -- so as to entwine the sites completely. The rad worker trainers for ORNL were still based mostly at ORNL but they answered to their new multi-site training organization. Chem Tech, with their usual eye to the main chance, saw an opportunity. At some point they had lured Fay Frederick over to start a training group for them. She had started at ORNL in the former ORNL ES&H training organization, then had moved to the Radwaste division to head up their waste generator training. In Chem Tech, she started a rad worker training course. It took significantly less time than the central one did and her group was said to be more "accommodating" to those divisions besides Chem Tech who sent students, such as the Plant & Equipment Division (which was rumored to be sending most of its craftspeople there). We wondered how the time compression was being accomplished -- and what might be left out. I took the Chem Tech rad worker training requal course one year. The chief "practical factors" instructor was certainly competent, but then he had only four students that day. The real problem was the written part, which was wholly computer-based, was not really proctored, and was not as comprehensive as I had seen in other years.

But worst, Chem Tech's having this training was, as the audit report implied, against the ORNL rule requiring approval by the head of ORNL training, a person I'll call Q. Sims and others protested to higher ORNL management about the unapproved course, but to no avail -- Chem Tech got its way. I was told that Frederick claimed that her course had been approved but she couldn't produce a memo to prove it; Q reportedly said at first that she hadn't approved it, then said she had, then waffled on that. At any rate, Frederick was not able to prove to the audit team's satisfaction that her course had in fact been approved. This did not faze the ORNL powers that be: her course was still being given for a long time afterward.

Soon after this, I saw that the LMES Central rad con committee minutes stated that Frederick proposed that the practical factors portion of Rad Worker II Requalification Training (including donning and doffing protective clothing) be conducted at the individual's actual job site "under the direction of a qualified [line] supervisor or HP". She stated that the reasons were that the "resident HP [local rad tech]" could "gain an assessment of the employee's abilities" and it would "allow the worker to be productive while in the training mode". The committee agreed that if the proposal was implemented, the evaluators would be "HP personnel designated by the site rad protection manager", i.e., by Sims at ORNL. I do not think this proposal was ever implemented, but that they did not dismiss it out of hand was dismaying. Having non-trainers, such as potentially dozens of different supervisors and rad techs, supervise this particular activity, rather than the independent training group with its set of uniform standards and consistent delivery of content, seemed nutty to me.

Note here Frederick's advocacy of O&R-friendly provisions: she would have approved having a line supervisor or local rad tech judge an employee's proficiency. Having a worker "be productive while in the training mode" means that the worker can go in and do work while not having had training signed off yet, since entering and exiting can be part of this training; this idea was generally opposed by both trainers and rad techs. Note that "productivity" -- often code for maintaining a production schedule rather than

enhancing worker efficiency and effort -- was cited as a reason for lowering training standards. (In 2000, Frederick became the head of the entire ORNL central training organization under UT-Battelle.)

AEG-RE Meeting, 12 August 1996

Mei announced that the ORP budget cut would be 9% for FY '97 and 11% for FY '98. AEG-RE's reduction would be covered by not filling the retired Sam Gheesling's position, but the Source Control subgroup would still be hurting financially. In 1999, if the budget was really tight, AEG would have to charge out much more. The news of the cuts was alarming, since they would amount to a very substantial 20% over two years. It did not seem possible that AEG could continue without either charging out significantly more or laying off people. The reference to filling Gheesling's position seemed gratuitous, since it had been vacant for well over a year and ORP was obviously using the money for other things, including, as noted earlier, to pay Butler and Ohnesorge. So where there had once been a high of five ALARA/rad engineers (Gheesling, Westbrook, the Data Base Queen, Geber, and Utrera), there were now only three, or 3.5 if one counted Mei's time in supervising and participating in these activities.

Geber and Utrera suggested that AEG could tap into the gamma spec "market" in waste characterization, since RSS was making the money off "our instrument". That is, Mlekodaj (possibly under duress) had loaned AEG's NOMAD (gamma spec instrument) to RSS and an RSS rad tech was using it to do waste generator certification for the Radwaste division. The tech was charging only for his time -- money that went only to RSS -- and nothing for the use of the instrument. So the cost of maintaining the NOMAD was borne entirely by AEG and was not offset by RSS' use of it. It was another example of the fishy ways that money was redistributed around ORP. Mei thought that if the Source Control techs could learn to use the NOMAD, Source Control could generate some support money. We had reservations about rad techs doing gamma spec'ing without supervision by an experienced professional, as we believed was the case in RSS. But in AEG, both Geber and Utrera had gamma spec experience and thus the Source Control techs could work with them. Eventually a Source Control tech was sent off to a gamma spec course (on AEG's dime) and did gamma spec work while in AEG. But eventually she went back to RSS and took her skills with her -- and ended up doing gamma spec'ing for RSS.

Mei also reported that during a visit to the Hanford site as an auditor, she found that PNNL (run by Battelle) had 50 rad techs and 5 rad engineers. PNNL's highest individual dose was 1500 mrem and the collective dose (which I am not sure was for PNNL alone) was 65 man-rem for the previous year, with 70 man-rem expected that year. A DOE audit had criticized the educational background of the PNNL rad engineers. Westinghouse was doing cleanup elsewhere at Hanford and had even more people than Battelle; they had both central and field rad engineers and even a field rad engineering manual. Mei gave us a rad engineering document from Westinghouse and noted that DOE had asked Westinghouse about their rad engineering qualifications also -- presumably DOE's criticism of PNNL was partly based on their positive observations of Westinghouse people's qualifications. My old boss, Joe Setaro, liked most people and groups and had positive things to say about most other sites, but the one he nearly always spoke of disparagingly was PNNL, because PNNL so liked to toot their own horn; thus it was of interest that DOE criticized the qualifications of their rad engineers. Even so, PNNL had 1 rad engineer per 10 techs, while at this time ORNL had 1 rad engineer per about 20 techs and one-half a rad engineering supervisor (since Mei figured her time supervising AEG-RE as 50%) per 12 or 13 rad tech supervisors. Mei didn't tell us the figures for Westinghouse Hanford, but their ratios also appeared to be better than ORNL's.

Finally, Mei announced that the upcoming DOE audit of ORNL ES&H might not take place, since DOE thought that the LMER-LMES audit of ORNL could cover it. That DOE was thinking of accepting Lockheed Martin central's internal audit of ORNL ES&H in lieu of performing its own audit amazed me. Why would DOE take a contractor's word for how well it was doing in compliance and meeting goals? This seemed a travesty of oversight. I am not sure if DOE did do its own audit that year, but I believe not.

More Trouble with Chem Tech: The Building 3047 Hot Cell Affair

In September 1996, Dan Ramey of Chem Tech sent an E-mail message to Sims regarding a Building 3047 hot cell issue. In what can only be described as a rant that was remarkable for its chutzpah, he complained about AEG in general and Geber in particular. He called his experience in interacting with Geber a "disappointing experience" and said that AEG was "woefully lacking of any non-reactor nuclear experience", producing "nothing but eleventh hour bickering about insignificant details of the proposed action steps" and having "NO VALUE ADDED". He claimed that his interaction with AEG on MSRE was "less than useful and counterproductive" and that his MSRE gamma spec work was delayed by two months as he awaited AEG approval before continuing, with no definition of what AEG's objection was to his and Gross's proposed work (which took place in an area of "only 2-4 mrem/hr"). He termed these incidents "the bring me a rock game" and said that AEG needed to be "staffed with someone that can make a sound judgment based on facts and experience and also be able to backup recommendations with a logical argument". He also said that the AEG part of the ORNL ALARA program would work only "if the AEG is staffed with personnel that have field experience and have a predisposition to cooperate".

I think that Mlekodaj and Mei must have been taken aback at yet another example of an O&R division manager's bypassing them (as the RCS section head and AEG group leader) and going straight to the ORP director. Also, Mei, Utrera, and I were surprised at the allegation that AEG had held up the MSRE gamma spec work -- we were never given to understand that MSRE management thought we had any approval authority over the MSRE work, much less that they were delaying or altering it in any way in response to our objections, given their push-back attitude at our meeting with Rushton et al. on the subject. The reference to "only 2-4 mrem/hr" was a red herring. That was perhaps the dose rate in which most of the gamma spec work would be done; however, it wasn't the gamma spec workers' dose we had expressed concern about, but the use of the gamma spec data they collected in planning future operations that would involve higher dose rates to and a potential for intakes by other people. So his harping on the dose rate that existed during the scan showed that either he had missed the point entirely or he was obfuscating.

Finally, as I stated earlier, after repeated clashes at MSRE with rad tech Childs over Ramey's and his supervisees' nonobservance of rad rules, it was Childs who was removed from the project. Here on the hot cell project, Ramey appeared to be trying to do the same with Geber. This was shown by the personalized, "ad hominem" nature of his memo: Ramey and the MSRE project manager, Jim Rushton, had not liked the "message" that the three AEG people (all of whom understood the uses and limitations of gamma spectrometry) were delivering at MSRE and Ramey did not like Geber's "message" regarding the hot cell. So, as shown in Ramey's memo, the issue was turned into one of personalities and "field experience", when neither of these was relevant to the issues at all. In fact, neither Geber nor Utrera had any reactor experience (although I did) and Geber, Utrera, and I had each been at ORNL for 5 years or more at this point. So Ramey's reference to our not having any "non-reactor nuclear facility experience" was nonsense. Since Geber had consulted with me regarding the hot cell job because the preliminary readings and the claimed calculated dose rates in the work area were not consistent, Ramey was thus claiming that his calculations were more valid than that of two health physics professionals, one of them certified at the time and the other later certified. Our calculations were available to him had he cared to look at them, but he did not wish to delay the hot cell entry. So he tried to bully his way into obtaining approval for the job.

As always, Mei and Mlekodaj tried to smooth things over with Chem Tech. They arranged to meet with Sims and discuss what to do, while Sims arranged to meet with Ramey. In the meantime, Geber sent an E-mail message to Ramey, thanking him for transmitting some documents regarding the hot cell refurbishment (of which the disputed hot cell entry was one task), stating that he was looking forward to working with Ramey to complete the refurbishment "in a safe and expeditious manner in full compliance with applicable procedures and applying sound judgment". In a further Ramey-Geber E-mail exchange, Geber noted that the problem was that Gross claimed that a newly discovered 25 R/hr hot spot was the principal contributor to the 400 mR/hr dose rate at the doorway, while Geber thought that the known 750

R/hr spot was the culprit. Ramey claimed that they had shielded a particular hot spot on the cell floor, to no effect; Geber replied that he had observed the shielding and since it had not been well stacked, not much of the source was actually covered by shielding (i.e., there was a significant streaming path). He pointed out that he had modeled this situation using a shielding code and his results agreed with actual measurements. Ramey claimed that a detector looking down through a port in the ceiling gave good readings because it was well collimated. Geber replied that according from information from Ramey's own people, the line of sight of the detector was flawed: the detector was 3 feet above the cell, looking through a penetration that was 6 inches in diameter by 3 feet deep (the roof thickness), while the cell interior was 16 feet high, the diameter of the spot was 10", and the spot was offset from the detector penetration by 18 inches. Thus little of the spot was actually seen by the detector. (Technical readers may wish to do the math.) Geber said AEG's calculations indicated about 2 Ci of Co-60 in the hot spot, but Gross claimed that there was much less than that based on his measurements. Ramey said that his gamma spec team was experienced; Geber countered that trying to use gamma spec methods to quantify material, without proper calibration of the instrument for the purpose, was fraught with difficulties. Ramey continued to insist on an in-cell entry for taking radiation readings prior to the work, while Geber recommended using the in-cell (remote) probe, pointing out that the comparison that allowed reliance on the in-cell detector was an AEG suggestion. Finally, Geber reminded Ramey that such dose-saving evaluations were AEG's special job and that AEG and the rad techs were available to provide assistance.

The reader should contrast Geber's statements to Ramey's. Geber responded to Ramey's questions by providing technical and quantitative answers (e.g., regarding what he observed and what Ramey's own people told him about the geometry of the situation); he noted a technical reason why the estimate from the gamma spec data might be in error; and he offered a practical approach to save time but get good dose rate information (using the in-cell detector). Ramey offered mostly mere assertions that things were okay.

In early October 1996, Mlekodaj met with Mei and us rad engineers after his 17 September meeting with Sims, Ramey, Brad Patton (Ramey's section head), and Richard Shoun (Chem Tech DRCO). Regarding MSRE, Ramey admitted he hadn't known what was required and not required in terms of rad reviews and said that he was not aware of RPP-310 back then. He claimed that he mistakenly thought he could not proceed without AEG's approval on the gamma scan job; that he felt that AEG was questioning the value of the scans; and that the scans were "very useful" for what they were doing. Ramey also laid blame on his supervisee Gross by saying that part of the problem was that Gross was hard to deal with. Shoun said that the general perception of RSS by Chem Tech was not bad, but AEG was thought to be a bunch of "nitpickers". Mei then related to us what had occurred at her own later meeting with Shoun, in which he said that AEG was a "bunch of English PhDs" (i.e., that we were focussed on the wording and not the substance of documents), "stubborn", and "11th-hour work stoppers". Mlekodaj told us reassuringly that AEG had to follow the law and DOE regulations, so it was not really an ego question (as Shoun had presented it to Mei). Mlekodaj told us that if O&R facility managers were violating the law, we should write an RER (Radiological Event Report), or go tell management, or do whatever else was necessary.

Note that at some point at about this time Herman Phillips became Gross's supervisor, reportedly because Ramey and Gross did not get along. We found it ironic that although all clashes with Chem Tech were deemed to be our fault -- the result of our allegedly disagreeable personalities -- Chem Tech was not one big happy family either. Note that Ramey admitted that he was not familiar with the rad protection procedures, although the RCM had required him and all O&R managers to be. It was to be expected that Ramey would try to throw blame everywhere but in his own direction, given our past experiences with him, but I was saddened by Shoun's statements. He had generally presented himself to AEG as being cooperative and he had stated at various times that his fellow Chem Tech people (task leaders, etc.) did not keep him informed of rad operations in his division even though it was his job as DRCO to know about them. Yet here he was piling on with his fellow Chem Tech'ers in criticizing AEG to Mei even

though he probably was not aware of what his people were doing when they violated RPP-310 (and even though he of course had not been involved in the gamma scan discussions).

Saddest of all was that despite Mlekodaj's urging AEG to write an RER, tell management, etc. -- and although he meant it when he said it -- these actions were impossible or were doomed to fail. For one thing, AEG people could not write RERs, only rad techs could -- the standard operating procedure that governed RERs was "owned" by RSS and only they were authorized to use the RER computer system. For another thing, higher management evidently did not want to hear what we reported.

Over 8-10 October 1996, four Radiological Event Reports (RERs) were written against Gross by rad techs David Craft and Chris Grainger regarding Building 3047 work. All of these RERs involved deliberate and conscious violations of rad protection procedures. The Chem Tech supervisor's response to one violation, quoted in the RER, was that it was a "nominal" violation. There were two other RERs written in July and September 1996 where the offender was probably Gross although the name was not stated. (The anonymity was due to a temporary flap about not putting names even in the restricted-access full reports; this was in deference to O&R people's objections to having their deficiencies publicized even within the restricted circle. But this anonymity requirement soon had to be rescinded because it was important to be able to computer-sort on the RERs to see if there were any clusters on individuals.) In all, there were six 3047 RERs in which the offender's supervisor was listed as Phillips, Gross' supervisor. Sims remarked bitterly to me that after all this, Gross received an award for completion of this project "although he had five RERs written against him" during it. Sims said that this demonstrated that ORNL did not really value safety above operational completion -- which should be remembered in light of Sims' later actions.

In 10 October 1996, Mei told us that Chem Tech had told her back in August that a window replacement in Building 3047's Hot Cell C was urgent and that they wanted to do it then. (I am not sure if this was the same hot cell as Geber and Ramey had clashed over or not.) But as Geber noted, there was a holdup due to high dose rates in the cell, which they tried unsuccessfully to reduce using acid washes, etc. As AEG rep, he was hearing only from the complex leader, John Slaten, not from Ramey et al., who were planning and executing the project. Also, regarding her recent meeting with Chem Tech's Patton and Shoun, Mei said that she told Patton details that he was unaware of. However, Patton replied that while he supported work stoppages for significant problems, a rad protection person should "cooperate" with the task leader if the problem was not significant and the job needed to start. (Apparently he was equating not signing off on a review on short notice with stopping work, which is not the traditional interpretation.) Geber, Utrera, and I said that that was ridiculous -- we felt that Patton was making excuses for Chem Tech's failure to adhere to the procedures and was again trying to blame our personalities for this. We made arguments to Mei in favor of our position. Mei told us that Patton too claimed that Ramey was not familiar with RPP-310 (the review procedure) and had asked Steve Hamley (of our section but not of AEG) about getting training on the procedure. Patton quoted Hamley as saying that the RCM was to be discontinued and RPP-310 would be changing again, so any training now would therefore be wasted. We AEG peons reminded Mei that although Patton, Ramey, etc. should already have been familiar with the RPP requirements, they and other line people kept protesting that they were fuzzy on them when they were found to be ignoring the procedures. Patton, according to Mei, said that he "couldn't" (didn't have time to) read all the RPPs and follow them without training. We discussed what response to make to him. It upset us that Hamley had made statements about a procedure that AEG was the subject matter expert group for. His answer was unhelpful too because it did not contribute to resolving the training problem.

All of these episodes in Chem Tech's guerrilla war against AEG left a bad taste in our mouths. We were ostensibly supported at each point by our management, but we never got a retraction, much less an apology, when we were savaged unfairly and, more important, unjustly. Outright misstatements were not challenged by our management, including the shocking claim about our lack of field experience being

responsible for line management's failure to follow procedures. It seemed that anybody could take a potshot at us, could blame anything on us, and it would stand unchallenged.

AEG-RE Meeting, 11 September 1996

Geber reported that a craftsman in Building 3047 (run by Chem Tech) said that his leg was swelling after a 70-mrem hot cell entry (a 1.2 rem/hr field for 5-7 minutes). The craftsman and his fellows seemed anxious about going into that area. Geber answered questions they had about multi-badging because the complex leader, John Slaten, never talked with them about using five dosimeters (as they wanted, it seemed) instead of the three actually used. Geber also said that Slaten told him that the Building 3019 facility people (Chem Tech again) used nitric acid and a hot lamp all weekend to try to remove hot cell contamination. The question arose as to how the lamp was powered: clearly they must have opened the hot cell door to run in a power cord. This was done without rad tech support, contrary to the requirements of the Rad Work Permit. Geber told us that when he asked Slaten if he had spoken to 3019 management about this occurrence, Slaten said he was "waiting for the right moment". Slaten apparently did not write an RER about it either and of course no occurrence report was written.

AEG-RE Meeting, 10 October 1996

Mei noted that the Bethel Valley storage tank project manager said that the pumps, etc., were ORNL's and that the probable contractor, AEA of England, would be taught by ORNL to use the equipment so they could run it instead of ORNL. We agreed that this did not seem to make economic sense, but as usual DOE thought that having many companies involved in work was more fair and would keep costs down by fostering competition. Mei thought that AEA would have its own rad techs also, so the experience of our rad techs in that facility also would not be used. Separately, Geber observed that RERs indicated that a rad tech was found not to be frisking items he was green-tagging (for release), but this tech was not fired.

Health Division Audit, October 1996

Having been assigned by Sims to the ad hoc internal audit team assessing the Health Division, I attended the assessment team kickoff meeting and training session. The team was headed by Pete Hoke of the Office of Quality Programs and Inspection (OQPI). My audit interviews began on 12 October 1996, when I met with Dr. James Phillips and his nurse-assistant Ms. Kennedy. I also met with Carl Burtis, who had come to the Health Division less than an year earlier from CASD (chemistry) to work on updating the Health Division's procedures. (I wondered why a chemist with, apparently, no experience with medical work would be assigned to rewrite the Health Division's procedures, but I didn't ask. Years later, I saw an article in the newspaper about Burtis' receiving an award from his alma mater -- his accomplishments seemed impressive, so I wondered all the more what he had been doing in the Health Division.) Burtis said that he had been working on this for about eight months and it might be a while before he could get to the rad-related procedures (including those affected by the RCM and 10 CFR 835, with which we were already supposed to be in compliance). The next day, I reviewed the Health Division procedures related to rad protection, including those dealing with emergency actions and decontamination of personnel. I was shocked to find how out of date and incorrect these procedures were. For example, some of them referred to a decontamination facility that had not been in use for a long time (see Chapter 3). Other procedures had been somewhat modified to refer to a new facility -- actually a modified room in an existing changehouse -- but this room did not seem to be ready yet, e.g., it had not had a readiness review, including a check to see that all procedure-listed supplies were actually present. Thus these procedures too were not correct for this use. There were references to a wound probe that the Health Division no longer kept operational. In addition to the out-of-date information, there were many errors. I concluded that the procedures were not only out of date, but years out of date.

I then met with Dr. Phillips and Ms. Kennedy. I found out that apparently the last time any of the doctors had taken an emergency preparation course or review was a REAC/TS course perhaps 7 years earlier. (REAC/TS is DOE's radiation emergency treatment and training facility in Oak Ridge.) Dr. Phillips and

Kennedy were uncertain as to the last time that the Health Division had participated in an ORNL emergency drill -- it seemed to have been at least several years. They could not confirm that the new emergency facility was indeed ready, even though Dr. Phillips was the nominal facility manager; e.g., they were unsure of who was in charge of stocking the facility. I asked them when the procedures were to be updated. Dr. Phillips was very vague about it -- his attitude was that they would get to them when they got to them. I asked why they had closed the old emergency decon facility when the new one was not yet ready; I asked how the medical staff was to get to the new one in an emergency, since it was several blocks away. (There was that small additional decon area in the Health Division area itself, but it was a tiny room acknowledged by external auditors and ORNL itself to be too small for multiple people or for staging for significant contamination.) I pointed out that there were compliance issues as well as safety issues here and that if an emergency occurred we could not be certain of an adequate response.

Following my preliminary questions, I attempted to question Dr. Phillips more closely as to the schedule of upgrading of the procedures. This might have been a mistake: it may be that best auditor practice would have been just to write him and his division up and then wash my hands of it. But I was concerned about the state of unreadiness of the Health Division to respond to emergencies and I thought that as the rad protection auditor, I was supposed to find out Dr. Phillips' plans, if he had any, for remedying these significant deficiencies.

My questioning irritated Dr. Phillips. He appeared to be insulted that I did not accept at face value his "we are very busy and we will get to it when we can" statements and that I asked for specific statements as to planned corrective actions. As many doctors do, he seemed to take umbrage that a person of his importance should be doubted at all, implying that these were all medical matters that I obviously did not understand. Kennedy was overtly rude: during the last part of the meeting, she expressed exasperation by repeatedly rolling her eyes at my questions and statements, even seemingly innocuous ones. I had never heard of an auditor being treated like this, even an internal auditor; when my division had been the subject of audits, we had been told to be completely respectful, cooperative, and forthcoming. The three of us did raise our voices somewhat, but we continued to talk about the matters at hand; we did not shout, call each other names, or make threats. The meeting was inconclusive since, having gotten through most of my questions, I realized that we were making no headway. We said our goodbyes.

That meeting took place on a Friday. On Monday morning, 16 October, Sims called me into his office and told me that Dr. Phillips had complained to him and Hoke about me and that Hoke had asked Sims to replace me on the team. I explained to Sims what had happened, giving examples of the deficiencies in the Health Division's part of ORNL emergency response. Sims sighed and noted that "Phillips wants to get rid of responsibility for doing [major] emergency decon -- he wants to send everybody to REAC/TS ". He made other statements indicating that he realized that Dr. Phillips was very much behind in emergency preparation and was being defensive, but he said that Dr. Phillips must be humored. His tone was sympathetic and in fact he said one or two explicitly sympathetic things to me.

But he also told me that to placate Dr. Phillips, Steve Hamley of our section (RCS) would be added to the assessment team to do the rest of my assessment. Hamley came to my office later to be briefed. I was allowed to meet with Sandy Parrish, the Health Division X-ray person, because that meeting was already set up, but Burtis and another member of the Health Division were also present -- I thought this was to oversee Parrish's communications with me. Parrish and I were already acquainted and this meeting was cordial and substantive. Parrish was well prepared to answer my questions and had some questions of her own. I promised to send her some information about X-ray ALARA (and I did). I was also allowed to provide some "bullets" later for the overall assessment report, although they may have been edited for the final version by somebody else. I had an appointment, set before my Phillips-Kennedy meeting, to meet with the head nurse regarding emergency preparedness; Hamley and I agreed that I should keep it. But the nurse stood me up. I asked about this and was told that she was "in a meeting". Later, I was told by one of

her people (she herself never got back to me) that she thought that the material to be covered with her was "covered by the Friday [Phillips-Kennedy]meeting". She had no reason to think so, as far as I could tell, so I suspected that Dr. Phillips or Kennedy had directed her not to meet with me.

I had been scheduled to participate in the audit of another division a few months later, but I found out eventually that another ORP person (I think Hamley) had taken my place -- neither my management nor the audit team head bothered to tell me. I was not surprised, since Hoke had not communicated with me directly about the issues with Dr. Phillips before he spoke with Sims and got him to take me off the audit team. But I heard later that at least one of the doctors was to be sent for a REAC/TS course refresher.

AEG-RE Meeting with Mlekodaj, 4 November 1996

Mlekodaj told us about the re-engineering effort going on at ORNL. It was led by an appointed internal committee whose mission was to identify work groups or functions where cuts could be made or where work could be conducted or arranged more efficiently. Mlekodaj and Mei seemed concerned -- I believe because of statements made by Sims -- that AEG would be strongly affected. They asked for input on the ALARA program and rad engineering, specifically what AEG-RE did and why we did it. Mlekodaj said that AEG's chargeout rate was \$39.10 per hour plus about 40 % overhead, for a total chargeout rate of about \$55 per hour. This \$55 per hour rate was said to be the same as the rest of ORP, which confused me. I didn't understand how ORP could charge the same overall hourly rate for the rad engineers as for, say, rad techs since the rad techs were paid a lower base hourly rate than the rad engineers. But again, the rad tech rate included the extra dollop to cover their supervisors, a kind of extra overhead charge, so that would raise their overall chargeable rate. This meant that although people in the O&R divisions believed that rad engineers' services were more expensive than rad techs' services, in fact the actual per-hour charge was the same. The rad engineers might even have cost less on a realistic basis since the rad techs charged for all overtime, while the rad engineers, as professionals, typically didn't charge for 4-6 hours of weekly overtime. I personally never charged overtime no matter how much extra I worked.

AEG-RE Meeting, 11 November 1996

We discussed technical aspects of our work at all meetings, but this one took the cake: my notes show extensive technical items on various subjects. But as usual, we also discussed the budget at length. Mei stated that ORP now had 205 people and that of all ORP, only AEG was to be looked at by the ORNL re-engineering team. We were to give our comments and observations regarding AEG work to Mlekodaj, with copy to Sims (I had already done so), and Mei was to talk at the upcoming DRCO meeting about AEG's NOMAD capability, i.e., to advertise it.

Mei also said that the ALARA program budget (with AEG serving as the staff) had \$350,000 in it, but only 1 FTE (full-time equivalent position) was funded by it because other people "partly charged" to it. Mei noted that at least half of Randy Gorman's time was charged to the ALARA program (again, he was in the dosimetry and records section but did charts for Mlekodaj to use at ALARA Working Committee meetings) and Gregory, although his work was mostly on instrument support for RSS, charged part of his time to the ALARA program, presumably because he was now DRCO liaison following John Alexander's retirement. (I wondered why this position had not gone to an AEG person, which would have been more logical, but presumably Gregory needed the support.) The Source Control people had some non-source-control activities: one was working on setting up the AEG home page, one had the fetal protection surveys and the gamma spec work, and the third spent 50% of his time doing rad-generating device inspections. Mei said, "Maybe we can teach [No. 3] to do some of the shielding calculations" to provide support for him. She told us that raises would be "performance-based" and there would be no raise for people below a certain performance rating. She noted that at other companies, people might get a bonus even though they didn't get a raise, but not at ORNL. Mei also said that if an AEG member spent more than 4 hours per week on any given project or facility, he should ask for a charge number. The Source Control techs (who shared a trailer with a group of RSS rad techs) told Geber that RSS all went out to eat

on year-end money (i.e., money that had to be spent before the end of the fiscal year) as a treat from RSS management. RSS had also ordered RSS-labeled and personalized hats and jackets from the Cabella catalogue (we had all seen the RSS people wearing them). Geber heard that the total end-of-year money available per RSS employee was \$400, although this was not necessarily all spent.

As the various comments indicated, it was not clear to us, even to Mei, how and why money was being allocated in ORP. On the one hand, AEG was getting pinched more and more and was trying to find ways to "attract new business" so it could charge out. On the other hand, RSS had a lot of money left over. Clearly the "extra" money could not go to raises, since there would not necessarily be money for higher salaries in the future. Even so, the extra RSS money could have been used for bonuses for high RSS or other ORP performers, as had been suggested, instead of giving everybody in RSS the same "gifts".

Mei told us that an RCS problem was that AEG was "not working as a team" with Gregory and Hamley. In my notes of this meeting, I added the comment "Duh!". That was because it was not AEG's choice but their choice. Bishop, Hamley, and Gregory all answered directly to Mlekodaj, so Mlekodaj could have made them improve their interface with us, but he did not choose to. He seemed to prefer to avoid confrontation and he seemed not to want to antagonize them, perhaps because they were allied with the rad tech organization. This latter statement may seem paranoid, but it was simple fact. As the events of 1995-1996 showed, AEG and Mlekodaj lost again and again to RSS on procedural issues, gatekeeper status, etc.; Sims favored RSS over RCS even in those technical areas where AEG was supposedly the subject matter expert group. Bishop, of course, was a former rad tech complex leader, while his minions and Hamley were all former rad techs. Gregory was a PhD, not a technician, who came to health physics from physics research, but nearly all the time I was at ORNL he and Hamley shared an office next to a complex leader/rad tech office(s) in a different building than Mlekodaj's and ours. Later, RSS group leader Dale Perkins moved there also. So the "peer group" around Gregory seemed to be RSS types.

AEG-RE Meeting of 17 December 1996

Mei said that AEG could propose changes that got AEG more involved and that AEG itself could now prepare ALARA plans (as a savings in time). (Originally, of course, line management was supposed to prepare the ALARA plans and have AEG review them, to provide line management "buy-in".) I observed that if facility management hired AEG to prepare the plan, they might think they could dictate content; also, it might be argued that no "separate, independent" AEG review would then be required (which might or might not be a good idea). Mei was clearly trying to find ways to keep AEG involved at least to the degree it had been before in work planning and to increase chargeable involvement, such as preparing ALARA plans. This would be in contrast to the RPP-310 reviews, which had always been covered under the ALARA program overhead (to make it palatable to line management to have them done).

Mei also told us that AEG could still use Ohnesorge's and Butler's services next year. While Mei and Ohnesorge had been redoing the toxicity value tables in RPP-349 (on hot cells, gloveboxes, and benchtop work), it was Butler who had revised the text of RPP-349; Mei didn't know about it earlier because Mlekodaj assigned Butler to do it and didn't think to tell her about it. Butler was also working on responses to REDC ALARA suggestions. I noted that I had suggested that ALARA recognition be provided for suggestions by craftsmen Blackburn and Light on an RRD project, but RRD gave us to understand that it wanted an informal resolution of these suggestions (I suspected so that the resolutions wouldn't be in writing). Butler was also doing contamination incident sorting for Mlekodaj; Bishop and Gorman also seemed to be working on this. I pointed out that compiling numbers by themselves meant nothing without analysis (trending), which ORP seemed not to do much of. It was clear that various ALARA-related evaluative and analytical tasks that formerly were AEG work were being performed by people answering directly to Mlekodaj but not in AEG. It was his prerogative as ALARA Program Manager and RCS section head to do it this way, but as with RPP-349, he would sometimes assign a function or task to someone when he had already told or implied to Mei that her group would work on it.

Also, AEG-RE staff went to conferences and meetings and came back with relevant information that was not put to use because Mlekodaj was not consulting or debriefing us. The ALARA Suggestion problem will be discussed later, but it should be noted that although it had long been AEG's responsibility and Mei had assigned it to me, suggestions were being routed to Butler for him to address.

Mei told us that Mlekodaj had not responded to her questions about the interface with MK-Ferguson. She said that she would ask him again, but "after I ask him something three times without any response, I realize I should keep my mouth shut" (i.e., she was then sure that he did not intend to answer). We saw that under the ITO (DOE contract) scheme, it was not clear who provided oversight. DOE didn't want to pay for oversight of ITO contractors by Lockheed Martin -- but still wanted LM to be responsible. (There was more than I indicate here that could be said about oversight problems with subcontractors and with other prime contractors such as MK-Ferguson.) Mlekodaj was dealing with these problems by simply not addressing them. That is, he could have asked Sims for a ruling, Sims could have asked Swanks for a ruling or a consultation with DOE, and so on, but for some reason nobody would. Even so, Mlekodaj could have told Mei definitively that no guidance would be forthcoming from above. This "head in the sand" approach tended to be a notable feature of ORNL ES&H management from this period on.

Performance Review, Late December 1996

I always got good performance reviews at ORNL. My biggest virtue was usually said to be my work ethic and productivity; my biggest fault, a tendency to be impatient. But in my December 1996 performance review, on the "Performance Factors" sheet, there was an entry in the "Work Practices" box that said "She constantly contributes new ideas and methods to the work environment; shows enthusiasm and interest in her job. Sometimes gets sidetracked on time-consuming crusades that add little value to her performance". I wondered what the heck that was all about. I asked Mei about this entry, which was supposedly written by her. She was evasive. Because of this and because the wording was not at all "Mei-speak", I suspected that someone had given it to her and ordered her to include it. Mei agreed to allow me to add a comment of my own, as was my right under the performance plan system. I wrote that I objected to the inclusion of the word "crusade" on the grounds that it was a loaded and pejorative expression and that what it meant was not clear. I also objected because no examples of any Westbrook "crusades" were given. I wrote that without any indication of what crusades I was supposed to have engaged in, i.e., without any specific problem identified, I could not know what in my behavior I should modify. I stated that I was willing to change, but I couldn't so on the basis of such vague indications.

Note that Mei did not cite any examples to me orally, add any counterstatement to what I wrote, or modify the "Work Practices" entry in any way. I think that it was Sims who dictated that this be included so that he could tell his higher-ups and probably Dr. Phillips that I had been disciplined or at least had had my offense immortalized in writing. Note too that in my discussion with Mei, I told her specifically that I regarded my removal from the Health Division audit and the statement in my performance review as retaliatory. She just made sympathetic but evasive noises.