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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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BRIEFING ON NRC TRAINING CENTER

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PUBLIC MEETING

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Nuclear Regulatory Commission

One White Flint North

Rockville, Maryland

Thursday, January 3, 1991

The Commission met in open session, pursuant to notice, at 1:30 p.m., the Honorable KENNETH M. CARR, Chairman of the Commission, presiding.

COMMISSIONERS PRESENT:

KENNETH M. CARR, Chairman of the Commission

KENNETH C. ROGERS, Member of the Commission

JAMES R. CURTISS, Member of the Commission

FORREST J. REMICK, Member of the Commission

STAFF AND PRESENTERS SEATED AT THE COMMISSION TABLE:

SAMUEL J. CHILK, Secretary

WILLIAM C. PARLER, General Counsel

JAMES M. TAYLOR, Executive Director for Operations

EDWARD JORDAN, Director, AEOD

KENNETH RAGLIN, Director Technical Training Center

R. LEE SPESSARD, Director, Division of Operational Assessment

P R O C E E D I N G S

(1:45 p.m.)

CHAIRMAN CARR: Good afternoon, ladies and gentlemen.

This afternoon, the staff of the Office of Analysis and Evaluation of Operational Data and the staff of the NRC Technical Training Center will brief the Commission on the status of NRC Technical Training Programs.

The Commission was last briefed on this important subject in September of 1989. Following that briefing, the Executive Director for Operations provided the Commission with responses to some supplemental questions and suggestions.

As part of this briefing today, the Commission hopes to hear an update on some of the initiatives described in those responses. I understand that copies of the briefing slides to be used today, as well as the Technical Training Center's Annual Report, are available at the entrances to the meeting room.

Do any of my fellow Commissioners have opening remarks?

(No response.)

If not, Mr. Taylor, please proceed.

MR. TAYLOR: Good afternoon. With me at the

table, to my left, Ken Raglin, head of the TTC; Ed Jordan, whose office supervises the technical training, and Lee Spessard, also from Ed Jordan's office.

I've been associated with the Technical Training Center at various times through my entire career here at NRC, and I believe that I've seen steady improvement. And I would note that this Center performs a very, very important function in the technical training for inspectors, reviewers, and a large segment of the NRC staff.

With those thoughts, I'll turn the briefing over to you, Ken.

MR. JORDAN: Okay. Thank you, Jim.

We're pleased to provide you an update on the agency's program for technical training for the professional staff, and we will review the progress that's been made since our last briefing.

I would comment that among the international nuclear regulatory programs, we find that the NRC's Technical Training Program has become an ideal. Our program is more comparable to the industry programs, and we feel that's appropriate. That is our goal.

Last year, our emphasis in the presentation to you was on the change that we've made from responding to individual training desires, to the identification and

development of programs to respond to office needs. These needs were derived from training and qualification programs that have been laid out for most of the technical positions in NRR, NMSS, AEOD, and the regions.

We recently forwarded to you copies of our Annual Report describing our accomplishments with respect to the mission of equipping the NRC professional staff, with necessary technical skills to support the programs.

Currently, through the direct instruction and contractor support, the Technical Training Center provides over 230 course-weeks of training a year to the professional staff, with over 100 individual courses available in the course syllabus that are clearly developed and scheduled on a regular basis. Most of these courses included graded examinations, with pass-fail determinations that stimulate student work and provide a measure to management on their progress towards qualification.

These are tough courses that entry level personnel with no nuclear experience have experienced difficulty with. Because of this difficulty and the increased ratio of inexperienced to experienced personnel currently being hired and projected for the future, substantial changes in our training program are under development to accommodate intern-level personnel. A

separate paper is coming to the Commission in the near future, to address these and other changes in recruiting, retention and training.

I'm extremely proud of the progress that the Training Center has made in providing high quality technical training responsive to Program Office needs. An illustrative example I would give is about a year and a half ago, we identified a problem within the agency, of not addressing risk and accident sequences by our inspector personnel and some of our technical staff.

And, so, the Training Center has gone through what I would call a "culture" change to adopt a risk perspective by each of the instructors going through the risk-based training and in modifying the training programs to include accident sequences as a part of the training as they go.

Things I would emphasize in this year's presentation is the responsiveness to Program Office needs, and the close coordination and mutual support that's occurred between NRR, NMSS, Research, the office personnel, GPA, and the regions. There is a very strong connection between those offices, and a mutual support that's admirable, I think.

The strength of this program is based on the high-quality leadership provided by Mr. Spessard and Mr.

Raglin, and the dedication of the staff of 28 people at the Training Center. That staff includes -- that 28 includes Ken Raglin and three administrative personnel.

The combination of experience and qualifications is outstanding. Nineteen of the staff have Navy nuclear experience, 17 have held senior reactor licenses of certifications, 12 of these have senior reactor operator instructor experience with utilities, seven of the instructors have prior NRC experience as inspectors or license examiners and, in addition, two of the staff health physics certified.

These instructors, as a group, develop the curricula, manage the contractor support, teach courses, develop training aids, maintain the simulators, and have participated in upgrading the simulators directly.

It's also important to mention the excellent facilities in Chattanooga. The Technical Training Center is about five miles from the city, in an office complex near motel facilities. The environment is pleasant, the accommodations are in a low-cost area.

We currently occupy three floors of a modern office building, about 32,000 square feet, housing seven classrooms, three simulators, training aids that we will talk more about in the presentation, and office space.

The annual budget for the Training Center for

1991 is about $3.5 million, which includes $675,000 for facility administrative support, rent, utilities, and supplies. That's a capsule summary and, before I give all of Ken's paper, I'd better give him an opportunity to speak. Ken?

MR. RAGLIN: Thank you very much, Ed.

COMMISSIONER REMICK: Could I ask a general question?

MR. RAGLIN: Yes, sir.

COMMISSIONER REMICK: I think, historically, the reason the Training Center was located there was because of TVA simulators, and we rented training from maybe TVA or General Physics, is that right?

MR. TAYLOR: That was one reason, was that we -- at that time, we used the simulators that TVA had over at Soddy-Daisy --

COMMISSIONER REMICK: Right.

MR. TAYLOR: -- and they had two simulators. They had a -- both a PWR and a BWR simulator. They, ultimately, then moved one of those simulators down to Browns Ferry, the BWR. That was one of the reasons it was located there.

COMMISSIONER REMICK: Has any consideration been given to the pros and cons of whether that's the ideal location now, versus other options -- and I don't

even know if there are other options -- but you've mentioned you have an ideal setup there and I'm not questioning it, it's just the thought went through my mind.

MR. JORDAN: At the time of the reorganization, that was one of the considerations we made, was it appropriate to consider moving the Center and, based on economics and personnel, it was determined that it was economical to leave it in Chattanooga, even though we were pulling away from the TVA simulators. And the low-cost area -- the attraction that we have for hiring personnel in that area is a great benefit.

MR. RAGLIN: You might want to mention one other thing. It's particularly important to have students on an out-of-town basis, for most of those courses, because they are intense and students have to spend time after hours, two or three hours per night, working on --

MR. TAYLOR: That was also -- that was an important consideration.

MR. RAGLIN: -- and that's difficult to do if you have to go back to town.

MR. TAYLOR: It would be different now, if it were here.

CHAIRMAN CARR: A lot of the regions are

probably defense fund users.

MR. RAGLIN: The majority are, yes.

MR. JORDAN: Yes, we'll show the distribution, and they are about half.

COMMISSIONER REMICK: One other general question -- and I realize this is a tough one -- but when I look at the utilities' training programs there, they are training programs generally that train people, certainly, not only skills and ability, but primarily on skills how to perform tasks. It seems our personnel would have some of that, but not as much. We're not operating facilities and equipment.

So, to what extent is the training to increase the knowledge of our personnel versus the acquisition of skills to perform, if I've made myself clear. Is there any reason way of --

MR. RAGLIN: I don't know if there's a good way to quantify it. It's true that we're not training our people to be operators. We're seeking some of the skills -- for example, when we're training -- using simulators -- we're not seeking precision, we're seeking student understanding of what is happening, what's involved, what would the operator have to do, how hard is it to do. We don't particularly care whether the student becomes expert at it or not, he doesn't have time to.

We do several things that are demonstrations, observations, extensive scenarios that would be too complex to expect someone without intimate familiarity with the control boards, to react to.

So, I think it's a mixture of the two things. We do some of the same things that utility training programs do, and we do some things that, clearly, they don't do. We do because we're training inspectors and other types of personnel.

MR. JORDAN: We have clearly shifted from our initial training which was, in fact, a replicate of utility-type training to, in fact, gearing it to train our NRC personnel, and expanding it beyond training for inspectors, but to training for licensing project managers or health physicists, whatever the particular Program Office needs are.

COMMISSIONER REMICK: Well, in those aspects where we're teaching skills, how to do something, whether it's operate a simulator or some other skill our people might have to have for inspections, or whatever it is, to what extent do we utilize the systematic approach to that type of training?

Do we try to be up-to-date like we expect the utilities to be, with a systematic approach, or are we in the classical sense of we teach them what we think they

should know, and we give them exams on what we think are good questions, or do we go through the formal process of kind of learning objectives and examining people on those, and so forth? To what extent is that incorporated in our training?

MR. RAGLIN: The learning objectives and examinations linked to learning objectives are fully implemented. Systematic approach to training -- I think we've come further in the last year than we have ever come before, with a thorough review of inspection procedures balanced against the training requirements for inspectors. And there's been a very comprehensive effort that has taken place over the last several months in that area.

I feel pretty comfortable with the program being responsive to the needs. I feel comfortable with the learning objectives and the examinations insofar as we can examine on the skill. For example, in the simulator training which was historically developed to support resident inspectors and other reactor inspectors, the examination for the simulator is not having them operate something, it's really like a control board walkdown. It's as if the resident inspector is walking into the control room, and he or she looks at the control boards, looks at the indicators, looks at the logs, and

tries to determine if everything is as it should be or there are problems. And we do put in problems.

So, from that standpoint, we try to make the exams as relevant to the process as we can. It's not perfect, though.

COMMISSIONER REMICK: Well, to what extent-- and, once again, look at the systematic approach -- do you follow-up in the evaluation phase, with the person's supervisor, after he goes back to work, see if he has acquired the skills that were expected, ask him a year later whether he has them? To what extent do you implement an evaluation phase where it makes sense -- and I realize that maybe it doesn't make sense in all these cases.

MR. RAGLIN: Okay. We solicit student response immediately upon completion of the training then, after-the-fact response, we rely primarily on the line management. We have a Training Advisory Group which is represented by each of the Program Offices and regions, and there's a senior manager representing each of those groups. That's where we collect a great deal of the feedback on directions that the program needs to go.

Frequently, if people have strong opinions, they will write us and tell us suggestions --

COMMISSIONER REMICK: But you have no

systematic way of approaching those people to make it easy for them to provide you information?

MR. RAGLIN: In the context of a post-course follow-up questionnaire, no.

COMMISSIONER REMICK: Yes. Okay, thank you.

MR. RAGLIN: Okay. I'd like to expound a little bit on some of the points that Ed Jordan made, and I'd like to start with slide 3, please. (Slide)

This gives an indication of what we have been doing and what we project doing in the next couple of years, and it's a graph of course-weeks versus fiscal years.

Course-weeks, although not a perfect indicator, is one of the better ones that we have, and by that I mean if it's a three-week course, it's three course-weeks. Course-weeks is used as an indicator because it can be correlated to level-of-effort for the Training Center staff, if we're actually doing a presentation, or it also can be correlated to level-of-effort by a contractor, which can be converted to dollars. So, it's a reasonably good indicator for us.

And the graph shows some of the information that was shown at the previous briefing in September of 1989. At the time, we thought that we had perhaps reached a peak in FY 89 with the total amount of training

that was given.

If you look at the statistics for FY 90, you'll see a slight dip in the Reactor Technology -- and that's the one with the square symbols. This is due primarily to a comprehensive effort that was devoted to introducing the risk-based material into the course's course manuals and so forth.

The Specialized Technical Training course-weeks stayed about the same after some gains and some losses. There were some gains by a number of new courses that were added, particularly in the health physics and inspection techniques areas. There were some losses in the form of several course-weeks of training that were previously made available from FEMA. They cancelled for two years, a certain course that was attended by some people as supplementary training. So, when the pluses and minuses were added up, the Specialized Technical Training stayed about the same.

Looking forward to FY 91 and 92, we project increases in course-weeks in both areas. In the Reactor Technology area, the increases are generally associated with planned support for technical intern programs and for programs to develop new-hires who are not interns. These increases are projected contingent upon adequate resources to carry out this amou . of training.

Later in the presentation, I'll be providing some more information on what's planned with the technical intern support and the support for the non-intern replacement staff.

COMMISSIONER REMICK: What fraction of the training goes to new-hires and interns versus longer-term employees?

COMMISSIONER REMICK: That's a hard one to quantify. When we look at our statistics, we count students who took something, and that something could be Reactor Technology Training, it could be a series of courses, or it could be an individual training opportunity like Site Access Training.

What we do for replacement staff probably takes about three-fourths, or 80 percent, of our resources, at least that much. Perhaps more.

COMMISSIONER REMICK: So, by replacement, you mean new-hires --

MR. RAGLIN: New-hires, right -- someone leaves, a new person comes. The person may be an intern, he may be a former Navy nuclear person --

COMMISSIONER REMICK: Now, why is that? I assume people elect to take these courses, or a supervisor recommends, am I correct? If they --

MR. RAGLIN: Many are required.

MR. TAYLOR: Required for qualifying.

COMMISSIONER REMICK: For qualifying.

MR. TAYLOR: Yes, sir.

MR. RAGLIN: There are many qualification programs that are not -- I'll hit this on a later slide, but several different technical groups have documents which mandate training requirements, and this includes inspectors and examiners and so forth, and these are not optional courses.

In order to satisfy all of the requirements to be an independent inspector or an independent examiner, they must attend and pass these courses, or validate the courses by passing an exam.

COMMISSIONER REMICK: Well, why is it then such a large number for these new people, and there aren't older people qualifying for new positions, or new requirements, or -- you mentioned three-fourths of it is for basically new-hires or replacement people? Once qualified, don't they have other things to qualify for?

MR. RAGLIN: Some do. For example, once qualified in a given reactor technology, there are some technical groups which need to qualify in a second technology -- example, operations officers, or back-up resident inspectors, examiners.

So, as we look at who comes to the training,

it's a mixture. Most of the effort, though, is devoted to initial training.

COMMISSIONER REMICK: I see. Okay, thank you.

MR. RAGLIN: Slide 4 -- (slide) -- shows the organizational distribution of the training opportunities for both Reactor Technology and what we refer to as Specialized Technical Training -- Specialized Technical Training being non-reactor, including health physics, engineering support, inspection or examination techniques, and safeguards training.

The two pies there basically show that about half of the training opportunities are consumed by regional personnel and, when we're counting these regional personnel, we're also counting the Program Office functions in the regions.

About another quarter of both pies are used by Office of NRR personnel, and about the remaining quarter is used by everyone else. In the case of Reactor Technology Training, there is some training of contractors there, who will be contracted license examiners. The other piece of the pie, or the one labeled Other, for Reactor Technology, has -- the statistics are dominated primarily by Reactor Concepts Training, which is short training for non-technical personnel.

In the case of Specialized Technical Training, the piece labeled Other there, is dominated by state personnel who attend courses that are in-common between NRC staff and Agreement State personnel.

COMMISSIONER REMICK: In the area of Reactor Technology you just mentioned, are you incorporating some of the new designs in those courses?

MR. JORDAN: Advance reactors? No.

COMMISSIONER REMICK: Yes, advanced reactors. No, not yet. So, that would be a subsequent development that we are looking forward to. Okay.

MR. RAGLIN: Okay. Most of the effort at the Technical Training Center is devoted to training indirect support of qualification programs, as indicated in slide 5. (Slide)

We do provide coverage of the four U.S. reactor vendor designs -- G.E., Westinghouse, Combustion Engineering, and Babcock and Wilcox. We provide classroom and simulator training in each of these technology areas.

The cornerstone of our training for most of these positions is what we refer to as a Full Course Series, and I'd like to just define that because we use the term later in the briefing.

This full course series consists of a sequence

of four courses, the first one being a three-week Technology course, primarily classroom -- Systems and Components, Purposes, that type of thing.

The second course in succession is an Advanced Technology course, two weeks, primarily classroom. It covers transient analysis events, technical issues, technical specifications. The stress is on integration of systems and integrated performance.

The third course is a Reactor Simulator course. This is where the students get some hands-on training. It only lasts a week. The training is not designed to make them experts, it's designed to show them what is involved -- how do the systems respond, what is necessary in order to do particular evolutions, what does the response look like.

The fourth course is now an Emergency Operating Procedure Simulator course. It's an additional week of simulator training aimed specifically at the symptom-based emergency operating procedures for that particular reactor design.

This training that we do in full course series constitutes approximately two-thirds of the total staff effort in the Reactor Technology area. So, again, it's a series of several courses that are attended by a relatively large number of people, and it consumes most

of our reactor technology effort.

There are some other individual courses of shorter duration that are listed in our course syllabus and, in addition to the initial reactor technology training, we do provide refresher training for both inspectors and examiners. In the case of inspectors, the refresher training for the last two or three years has been oriented toward the Emergency Operating Procedures. In the case of operator licensing examiners, the refresher training has been oriented toward scenario development, using simulators.

There's also specialized technical training in support of qualification programs, particularly in the areas of health physics and engineering support. A couple of examples of HP courses would be an HP technology course, and diagnostic and therapeutic nuclear medicine course. Some examples in the engineering support area would be welding technology and codes, non-destructive examination, and anti-current testing.

Many of the specialized technical training courses end up being presented at contractor facilities because of the equipment that needs to be located where the training is provided.

(Slide) As indicated in slide 6, technical training is also provided in support of some other non-

qualification programs. We give four to six reactor concepts courses per year in Headquarters and regional offices, in support of the Orientation Program managed by the Office of Personnel.

We give national news media seminars at the Training Center, as requested by the Office of Governmental and Public Affairs, in support of the Public Affairs function. These are somewhat similar courses--short, designed for non-technical personnel, some coverage of boiling water reactors, some coverage of pressurized water reactors, some coverage of basic radiation protection fundamentals.

In the case of the news media courses at the Training Center, they are held there so that there can be some simulator demonstrations, and the news media personnel come from various sources -- magazines, TV stations, radio stations, newspapers, et cetera.

COMMISSIONER REMICK: Typically, a year, how many people participate in that -- the news media course?

MR. RAGLIN: We normally give a couple a year, and have ten or twelve media personnel for each course. We also provide Reactor Technology Training in support of the PRA Technology Transfer Program, also managed by the Office of Personnel, and those courses are normally given in the Headquarters area.

(Slide) Slide 7 indicates some of the special request reactor technology training that happens. This happens to be what occurred during Fiscal Year 1990. Occasionally, special requests come up. We try to respond whenever we are able. In this case, we were asked, and were able to do, a special course on the Browns Ferry simulator for NRR Office of Special Projects people. We were also able to give a special simulator course at the Training Center, for Mexican regulatory personnel who had attended a course that we had previously presented in Mexico about a year earlier.

COMMISSIONER ROGERS: How many people were in that, again?

MR. RAGLIN: Oh, six or eight.

And we provided reactor technology course in the General Electric and Westinghouse Design for State of Illinois people.

COMMISSIONER REMICK: How well equipped are we to handle things like that Mexican regulatory personnel course, if we had other requests? To what extent could we handle it?

MR. JORDAN: We do it on a space-available. We're really running at capacity. And, so, if there's an opportunity to shoehorn somebody in, we do, but they get second priority.

MR. RAGLIN: And as always, if someone wants a short course, it's easier to fit it in than if they want something longer, which is very difficult to stick in.

(Slide) As indicated in slide 8, there has also been much special request specialized technical training that was provided during the last fiscal year. Several accident-incident investigation workshops were given in regions and Headquarters.

A special seminar on replacement of nuclear parts was arranged for NRR through one of the Training Center task order contracts. Training was provided as requested by NRR, for specialized team inspections in the electrical area. These are the electrical distribution system functional inspections, EDSFIs, and two of these courses have been given to-date. A third is planned for presentation during this fiscal year.

Site Access Training has been provided at the request of NRR, to Canadian personnel who are providing technical assistance to NRR, through a contract AECL.

A quality assurance auditor course was arranged for NMSS personnel. This is to support NRC participation in audits of DOE and DOE contractor QA programs for the High-Level Waste Repository.

Another example is Mixed Waste Workshops, also requested by NMSS, to familiarize the NRC staff with

handling of mixed waste r equirements of the Resource Conservation Reco These are planned for presentation in each of is and Headquarters during the next year.

COMMISSIONER REMICK: What is the site access training, again, that was --

MR. RAGLIN: Site access training, that's the same thing that the utilities frequently call NGET, Nuclear General Employee Training. It's to obtain unescorted access at a reactor facility. It's RADCON basics and --

COMMISSIONER REMICK: Unescorted access?

MR. RAGLIN: Yes.

COMMISSIONER REMICK: But not to vital areas, I assume.

MR. RAGLIN: That would depend.

MR. JORDAN: The generic course gets them through the generic course that the utility would provide, and then there would be special training for vital area --

COMMISSIONER REMICK: Site specific.

MR. JORDAN: -- site specific.

COMMISSIONER REMICK: Do you offer the second part, or just the first part?

MR. JORDAN: No, the first part.

MR. SPESSARD: But then we also offer to maintain qualification.

MR. RAGLIN: Now, it's highlighted on there as special training for the Canadian personnel. We're also doing that for the NRC staff as a whole. Many Headquarters people received site access training and site access refresher training over the last two years. It's given up here on a quarterly basis.

Much work has been devoted to the development of qualification programs, and this is indicated in slide 9. (Slide) When we briefed in September of 1989, we described a phased plan for developing qualification and training plans for various Headquarters positions. This phased plan has led to the development of office letters and generic training plans, which now define training requirements for a number of Headquarters positions which really didn't have requirements so defined earlier.

All of the training that has been identified by their Headquarters offices, as high or medium priority, as part of this phased plan, is now available. Even while we were working on the phased plan with the Headquarters offices, we had always planned to go back and review regional positions and regional training requirements. This effort came to fruition during the last year. It was discussed at the Trai[illegible] Advisory

Group.

The Training Advisory Group then established a separate working group to thoroughly review inspector training requirements. This working group was chaired by an NRR manager. It met several times during the year, and it did a comprehensive review of inspection procedures training requirements. It's made a number of recommendations for changes to the manual chapter on Inspector Training Requirements, which we expect will be issued in the near future.

As a further endorsement of the importance to which the agency management places on development of its staff, the EDO has recently established a Technical Training Advisory Council, which will consider issues that cut across several offices and/or technical positions. This is a new body that will be chaired by the AEOD Deputy Office Director. The regular members will be Headquarters Deputy Office Directors, one regional administrator, and one deputy regional administrator. And the first meeting of this Technical Training Advisory Council is scheduled for later in January.

Slide 10 -- (slide) -- indicates support for technical intern programs, and we project considerable technical training support for the programs. These will

be described in more detail in a paper that will be sent to the Commission when development is done, as mentioned by Ed Jordan in the introduction.

In a nutshell, the technical intern programs will consist of three basic programs -- one for reactor engineer type positions, one for reactor health physics type positions, and one for nuclear materials health physics type positions.

In the case of the reactor engineers, what's presently outlined for their training is starting with a practical engineering course, which will provide them an understanding of the practical aspects of power plant operations.

Following this course, they will attend a new eactor technology course created with intern needs and experience in mind. Following that, they will go to a facility to become more acquainted with reactor plant systems and components so that by the time they come back to that full course series, they will be on a more even experience and knowledge basis than they otherwise would have because they will be in the same course that some of our more experienced people will be in. So, they will then attend that full course series, as I described earlier.

Following the full course series, they will

attend a new reactor safety course, which is being developed by the Office of Research. We project that all of this reactor technology training will be done during the first year for the reactor engineer interns. During the second year, these interns will receive some combination of rotational assignments and field experience, to additionally broaden their background.

In the case of reactor health physicist interns, the program will start with an applied health physics course. This is an intensive lab-oriented radiation protection training program. What we have in mind here is the existing course given by Oak Ridge Associated Universities.

Following that course, they will receive additional training in a course that we've labeled Intermediate Health Physics Concepts, and this will strengthen their understanding of radiation protection concepts and applications.

Following that, the reactor HP interns will then go to the new course -- the new reactor technology course for interns. They will be in the same course with the reactor engineer interns. And following that, they may have some field assignments and then continue with regular qualification programs.

In the case of the nuclear materials health

physics interns, they will start with that same applied health physics course as did the reactor HPs. Following that, they'll have some field experience. Following the field experience, they will then attend the same intermediate HP concepts course. And following that, they will then continue with the qualification programs and other development activities, such as inspection accompaniments and so forth.

COMMISSIONER REMICK: Two questions. Do the reactor engineer interns get health physics courses?

MR. RAGLIN: No.

COMMISSIONER REMICK: Nothing at all?

MR. RAGLIN: They won't -- no, they won't get any health physics training as such. Before they go on-site, they will get site access training either from us or from the licensee.

COMMISSIONER REMICK: Any special reason for that? Seems to me that would be important.

MR. JORDAN: You raise a good question.

MR. RAGLIN: That's a good question.

MR. SPESSARD: I might add, they would eventually get training of that sort, as they participated in other qualification programs for high-level positions, say, like a resident inspector, for example, something of that sort, which would then be

covered in a training journal for that position. But the basic program Ken just described for a quote "an intern" does not include that feature at the present time.

COMMISSIONER REMICK: Another question -- okay, fine. Another question -- what's the reason for separating out the health physics training for the reactor health physicists and nuclear materials health physicists, although I can understand that at the end of the program, their on-the-job experience might be different, but it seems to me that the basic health physics principles would be very much the same that you'd want them to know, and wouldn't this give you some flexibility in moving these people around -- if that made sense. I don't quite see why, other than in the on-the-job type of training, why is he different?

MR. RAGLIN: We have tried to make them the same as much as possible. They will go to the applied health physics course, be in common there, and they will both go to the intermediate health physics course.

COMMISSIONER REMICK: Well, it's the same course.

MR. RAGLIN: It's the same course.

COMMISSIONER REMICK: Okay.

MR. RAGLIN: The field experience will be different, though.

COMMISSIONER REMICK: Yes. Okay.

MR. RAGLIN: And then the reactor health physicists will get the additional training in reactor technology, so that they can better appreciate any field experience they might get at a facility.

COMMISSIONER REMICK: Okay.

COMMISSIONER ROGERS: Just before you leave that, Ken, have any interns gone through these courses yet, or are these all in the process of just being set up now?

MR. RAGLIN: They are being set up right now. We're looking at Fiscal Year 1991 as an interim year. We're doing what we can to position ourselves to fully support what the program offices are asking us to do here, and it will be partial implementation during this year.

We've given some forms of some of this, particularly in the case of the reactor engineer interns. We've given a practical engineering course. It's not exactly how we want it to end up, but we've given it-- we're working on several of these right now, but they're not all available.

Okay. Slide 11 -- (slide) Support for recruitment, development, and retention of new-hires. Within the reactor programs, the new-hires are expected

to be recruited in three general categories -- technical interns, personnel with no prior nuclear experience, and personnel with prior nuclear experience.

The distribution is roughly projected to be about one-third in each of these categories, and we will need to provide technical training to support each of the categories here.

In the case of interns, the input level we're looking at here is recent college graduates. In the case of personnel with no nuclear experience, these would be people with expertise, perhaps extensive expertise, in some particular area, but they are people who may not have had any nuclear training. It might be an electrical expert, for example.

In the case of personnel with prior nuclear experience, we're looking at the types of people that the agency has recruited in the past -- for example, former Navy nuclear, former commercial nuclear, former shipyard people, or what have you.

I just described the training that's projected for the technical interns. The training that's projected for the personnel with the prior nuclear experience will be about the same as we've seen for the past several years. That is, these people -- former Navy nukes or former commercial experience -- come with a great deal of

expertise, so they start right off in the full course series, and some of them even validate portions of that. So, we don't project any significant change in that area.

That middle group, the personnel with no prior nuclear experience, will likely receive about the same training as that being provided for the interns, only they will receive it over a longer period of time because they will be immediately available to be used in their area of expertise as soon as they are recruited and brought on-board.

Okay. The cumulative result of the plans for training both the intern new-hires and non-intern new-hires is that, essentially, all of these replacement personnel will receive a full course series in reactor technology. That's a bit different from the way it has been over the last several years. I would project that this will result in a gradual upgrading of overall NRC staff knowledge in reactor technology, as a result of that.

COMMISSIONER REMICK: What if we have an existing employee who did not have the benefit of these full courses, but is interested in doing it. Is that option available to that person?

MR. RAGLIN: We are certainly trying to make that option available because --

MR. SPESSARD: Yes.

MR. RAGLIN: -- we would project that some will want to do that.

Slide 12 -- (slide) -- shows how the training done at the Training Center is really driven by the various staff qualification programs. That phased plan that we discussed at the last briefing and mentioned earlier in this one, resulted in the issuance of the office letters and generic training plans which define training requirements for certain Headquarters positions.

Examples here would be NRR project managers and license reviewers, or AEOD operations officers. The training requirements for operator licensing examiners are defined in an examiner standard which is issued by NRR.

COMMISSIONER REMICK: Is that explicitly in there? I mean, does it say specifically what examiner training should have?

MR. RAGLIN: Yes.

COMMISSIONER REMICK: It does. Okay. I'm out-of-date on that NUREG, but --

MR. RAGLIN: The training requirements for inspectors are defined in NRC Inspection Manual Chapter 1245, Inspector Training Requirements. Now, that document is published by NRR, but it also includes

technical positions which fall within the NMSS program area, and there are many examples here -- resident inspectors, region-based reactor inspectors, engineering support inspectors, non-power reactor inspectors, reactor and nuclear materials HP inspectors, and so forth -- and that covers a big part of the training that we actually do.

The training requirements for some of the positions will be strengthened by a paper that will get to the Commission. At the time the slides were developed, we projected that it would already be there, so we apologize for that. If you would just make a pen and ink change on that.

Okay. Slide 13 -- (slide) -- provides a summary of the major technical training program changes as a result of several of these initiatives over the last year. And by these initiatives, I mean the work that's been associated with developing plans for technical intern training, the work that's been associated with the plans for replacement staff, the review of the inspector training requirements, and so forth.

One of the significant changes is that the full course series will be required for more people. It's always been required for some groups -- for example, resident inspectors -- hasn't always been required for

all people associated with reactor operations, and now basically will be required.

The emergency operating procedure simulator class has been added as a requirement in the full course series. The regions and Program Offices consider that to be extremely important to keep pace with the present emphasis on symptom-based emergency operating procedures. That's why it was added.

The practical engineering course or equivalent experience is being added as a requirement. That doesn't mean I expect a flood of people to attend that, but it does reflect recognition that the replacement personnel will not necessarily have the same background as the people we've seen in the past.

Attending that course will cover some of the material that we take for granted when we start the full course series.

COMMISSIONER ROGERS: How long will that course be?

MR. RAGLIN: It will be a three-week course. It will be at the Training Center, and it will make heavy use of some hardware training aids, which I hope to show later.

Some additional training will be required following initial qualification for some positions. For

example, the PRA basics for inspection applications course and an effective communications course, both managed by the Office of Personnel, will be required for some of the technical positions.

Finally, a regulatory philosophy refresher course will be conducted as refresher training for inspector personnel. This has been added as a result of comments at the last briefing on technical training and in response to some of the comments in the Regulatory Impact Survey. This training will involve visits by senior NRR and NMSS management, to provide guidance on consistency of application of regulatory programs.

COMMISSIONER REMICK: Does this course include the Commission's principles of good regulation, by any chance?

MR. SPESSARD: It will.

CHAIRMAN CARR: You got that?

(Laughter.)

MR. RAGLIN: Okay. As indicated on Slide 14-- (slide) -- one of the biggest developmental efforts at the Training Center for the last several months has been associated with incorporating the risk-based training perspectives into the Training Center courses.

A while back, senior management asked how well events such as interfacing system loss or coolant

accidents were covered in the curriculum. We looked at it. We determined that there was some coverage, but not enough. The existing coverage did not clearly relate the events to PRA technology and the results. Accordingly, a comprehensive plan to upgrade the course manuals was developed. Course manuals and, really, the culture at the Training Center was developed for the purpose of increasing staff awareness of risk-dominant sequences and major risk contributors.

Special PRA training for the Training Center staff was arranged through the Office of Personnel. We essentially had all staff training for the instructors, for the fundamentals of PRA course, the PRA applications and lessons learned course, the PRA basics for inspection applications course.

Early in the project, the NRR Office Director and AEOD Office Director visited the Training Center and provided senior management perspectives on the overall program.

The technology course, which is the first of the four courses in series, now has a PRA introductory module and, in each chapter within the systems manual has appropriate information relating to PRA, risk, core damage frequencies, and so forth.

The advanced technology course, which is the

second of the four courses in the full course series, also has modules on technical issues and plant events. Both of these are tied to PRA, to event trees, and to failure scenarios that could lead to core damage.

So, where we are is that we feel the project has essentially been completed. All the full course series, starting as of the 1st of January of this year, will incorporate these perspectives. It was a great deal of work, but we feel that the products of this are going to be well worth the effort that's been put into it so far.

CHAIRMAN CARR: Have you got something laid out to make sure your instructors stay updated on what's going on in the latest PRA efforts?

MR. RAGLIN: Well, we have our regular instructor qualification program. We have the lesson plans that are associated with these, and at the time the material was developed, we used all of the PRAs that had been done for plants that we could make any correlation with. That was not all that we wanted to do, so -- not mentioned here is a plan to continue reviewing the PRAs and to continue to add new material as it is appropriate.

COMMISSIONER ROGERS: Is this risk-based awareness really almost entirely PRA-oriented?

MR. RAGLIN: It's pretty much PRA.

CHAIRMAN CARR: Core melt progression, containment challenges?

MR. JORDAN: Yes.

MR. RAGLIN: Yes. Event trees. It's been a culture change. Looking at the training in the past, it's been primarily operationally oriented. That goes back to the roots of the training from its beginning, and the roots of the instructors, but now I feel we have-- we're retained the operational orientations, but we've thrown on top of it some risk perspectives that just weren't there before. The instructors certainly have a better appreciation for the significance of some of these things, so I'm quite sure that the students are going to have an appreciation for it.

COMMISSIONER REMICK: To what extent is the knowledge of the Commission's safety goals is incorporated in that course? Is there any discussion of the safety goals?

Another question -- there's a lot of criticism recently -- Senator McClure has been one of the most outspoken -- former Senator McClure -- of misuse of risk perspectives in regulatory activities, I think mostly addressed to EPA, but is there any kind of relative risk information provided to the people, so they can put these various risks in perspective? That fits in somewhat with

the safety goal, but do they have -- do they give them any information so that they can put the risk they are talking about, in perspective with other relative risks of society, so that they have a rounded view of the environment in which we are working?

MR. TAYLOR: I don't think that element has been introduced yet. Yes, we could look at that. We've been heavily trying to use the concept that PRAs have given much of the staff --

COMMISSIONER REMICK: I understand. I understand.

MR. TAYLOR: -- which is to understand sequences --

COMMISSIONER REMICK: Sure.

MR. TAYLOR: -- dominant risk, for various points because it will get the people to think that way both --

CHAIRMAN CARR: I think Commissioner Remick's question focused on what properly was probably the previous chart which said -- you were talking about a course in effective communications that you give people on -- it seems to me that's where you'd want to put your risk communication.

COMMISSIONER REMICK: Somewhere, I'm not sure where. I'll tell you why it comes up. Many years ago,

when I was a consultant licensing examiner -- I guess about the time of the Arab oil embargo -- I'm traveling with a large number of staff. And from my background at the university and on the Governor's Energy Council, Pennsylvania, was to be involved with a lot of energy programs. And I found that some of our very competent NRC technical staff -- at that time, the AEC technical staff -- weren't able to put these things in perspective -- all these new ideas on -- ideas that were going to solve our energy problems -- not able to put it in perspective. Now, that comes to mind in the case of risk and we're working with risk, and we definitely need the technical understanding of the things you're talking about but, also, for those people to be well-rounded, I think they have to have some knowledge of other relative risks in society, so they can put these things in perspective, and sometimes, perhaps, not get carried away then. So, it's the overall knowledge of these people, I would think --

MR. JORDAN: I think the answer there is that the new reactor safety course that we're developing through the Office of Research is going to try to give that overall picture, what is the philosophy of safety that's to be applied to nuclear plants, and how did it evolve, and how do we fit into that.

COMMISSIONER ROGERS: Well, I asked this because --

MR. JORDAN: I think it's a good point.

COMMISSIONER ROGERS: -- it's entirely PRA-oriented -- because PRA -- my understanding is, tentatives have become quite a formalized process, and whether some other aspects of this and other ways of looking at risk would be used here.

MR. JORDAN: Right. Now, the PRA that we're using in the course work and trying to convey to the students is really the product of what PRA has shown as opposed to how to --

COMMISSIONER ROGERS: Rather than the process.

MR. JORDAN: So, we're not developing practitioners through that process. The Office of Personnel provides those kinds of courses for practitioners, and we have provided that training for the TTC staff, but there, to convey to the students, what do we learn, what have we learned, and how to apply the PRA concepts in regulation of nuclear plants, and why do we worry about inner systems LOCAs.

CHAIRMAN CARR: I think the problem we're trying to get at is our technical people and our residents and whatever, always interact with the public sooner or later --

MR. JORDAN: Yes, they need a perspective.

CHAIRMAN CARR: -- and some of them are incapable of putting risk communication into perspective so the average public guy can understand that, and I don't know where that fits in the curricula here, but I think that's what we're trying to get at.

MR. JORDAN: The nuclear safety course is the one that we're adding, to try to bring things together for them.

CHAIRMAN CARR: That's a good objective, though, to have.

MR. JORDAN: Yes, it is.

CHAIRMAN CARR: All right.

MR. RAGLIN: Okay. In addition to the developmental effort that was devoted to adding risk-based perspectives, there will always be extensive development with the training program, as indicated in Slide 15. (Slide) This gives some examples.

The life cycle of training requires that the courses and all materials be constantly upgraded to keep the training current and responsive to the needs. For example, during the last year, new modules were added in the BWR manuals, on air system problems and surface water problems.

The B&W course manuals have been changed to

reflect the systems that the students use on the B&W simulator. That meant changing the reference plant for our manual, from Bellafont to essentially WNP-1.

Considerable effort was devoted to development of simulator procedures, particularly on the General Electric simulator. As delivered to us, there were many enunciator windows that did not have enunciator response procedures and, over a two-year period, we have built enunciator response procedures for every window on the enunciators. This doesn't matter too much during the inspector training, but it is important when we are training examiners. And, so, that's one that's been done.

Emergency operating procedure flow charts current to the latest revision of the BWR owners' group emergency procedure guidelines have been developed and implemented on the G.E. simulator, and they are used routinely in the courses.

Finally, the computerized examination bank system is in full implementation. This is a high-technology solution which results in more consistent examinations, better tracking of questions and question histories. All questions in the exam banks are now linked to specific learning objectives for each of the courses and course modules. The high-tech solution saves

considerable time over the manual methods that would be required to achieve the same results.

Slide 16 -- (slide) -- shows some information associated with the health physics curriculum. When we briefed last time, we reported progress in the HP arena, and we feel that there's been a great deal of progress in this area since that time.

Several courses within the HP curriculum were developed and presented during the last year. These included the health physics technology course, whole body counting-internal dosimetry course, irradiator technology, and an OSHA orientation course, arranged through OSHA.

That HP technology course is really the cornerstone of the HP training curriculum. It's a two-week course that we provide, and it's attended by reactor health physicists, nuclear materials health physicists, fuel facility health physicists. Many of the modules are in common, everybody in the same room. Several, however, are handled separately. We split into break-out sessions, where the nuclear materials people go in one room for material that's relevant to nuclear materials, the reactor health physicists go into another room to get reactor HP-specific information.

Within the health physics curriculum, certain

Technical Training Center courses are made available to state personnel, as arranged through the Office of Governmental and Public Affairs. Likewise, some of the courses provided by the Office of Governmental and Public Affairs are attended by NRC staff. This has worked out pretty well.

Some examples -- a course that we give and fund is the safety aspects of industrial radiography that's attended widely by state personnel and also by NRC staff. State personnel also get slots from time to time, in other courses -- not a big load, but occasionally we get one or two into things such as the diagnostic and therapeutic nuclear medicine course and the teletherapy and brachytherapy course.

The GPA courses that we are able to take advantage of and send NRC staff to are the inspection techniques course and the safety aspects of well-logging. That inspection techniques course is somewhat of a fundamentals of inspection type course that is relevant to the nuclear materials area. We also provide some instructional support from the Training Center for that particular course.

All courses that are required for initial qualification of nuclear materials health physicists are now available for attendance. The same thing is true for

reactor health physicists, with the exception of one course, a rad waste management course, which will be provided in May of '91.

COMMISSIONER REMICK: Do the health physics people get training in this perspective also? Do they get -- I realize it wouldn't be the PRA, but I think it's important for health physicists to be able to put the risk that they're working with in perspective also. I'm thinking of non-radioactive hazards and toxic waste risks and so forth. Some knowledge of that, I think, helps them put it in perspective.

MR. RAGLIN: We'll have to look at that, but nothing comes to mind right now.

Slide 17 -- (slide) -- shows some information on simulator management. The steady-state NRC needs for reactor simulator time are still estimated at about 1500 hours per year for General Electric and Westinghouse designs, and about 600 hours per year for Combustion Engineering and Babcock and Wilcox. These are numbers that are consistent with the last briefing, and we still continue to feel that those are good projections.

Long-term, cost-effective solutions have been arranged for simulator training in the General Electric, Westinghouse and Babcock and Wilcox design, through lease-purchase contracts, to acquire simulators. The NRC

now owns the G.E. simulator. Upon final payment in '93, we will own the Westinghouse simulator and, likewise, in '94 for the Babcock and Wilcox simulator.

We presently have no mechanism in place for providing Combustion Engineering simulator training. Procurement of a C.E. simulator is underway, as previously approved by the Commission. The procurement, although near the end of the proce right now, has taken a bit longer than originally anticipated. As a result, the previous contract which allowed C.E. simulator training at the C.E. facility in Windsor, has expired, and we're building up a little bit of a backlog right now. So, we'll have more on that as it evolves.

COMMISSIONER ROGERS: You don't have a projected date of when you would have that in place, the new C.E. simulator?

MR. RAGLIN: Can't say right now. The procurement is in process, and --

MR. TAYLOR: We're going to have to follow up with you on that. It's right in the procurement stage.

MR. RAGLIN: Slide 18 -- (slide) -- provides a graph of simulator usage and cost-per-hour. It's similar to the graph that was provided last year, extended forward a year, incorporating any new information that we had.

Simulator usage, measured in hours, for simulator training in all four vendor designs, is shown by the curve marked by the square symbols, and in the cost-per-hour, is shown by the triangular symbols.

If we look at Fiscal Year 1990, we see a dip in simulator hours. This is due, primarily, to minimal Combustion Engineering simulator training, while waiting resolution of the procurement effort for a C.E. simulator, and also a cancellation of one B&W full course series and a couple of associated simulator courses there. So, it's a bit lower than what we had anticipated. We still believe that the projected numbers for the future are good.

Looking at the cost-per-hour for the same year, it's a bit higher. This is because two of the replacement computers for simulator upgrades, one for the G.E. simulator and one for the Westinghouse simulator, were obtained during fiscal year '90, so the costs were higher. And that, coupled with the lower hours used, made the cost-per-hour a bit higher there.

Built into the figures here is the cost for obtaining time for C.E. simulator training, if that were possible, at the rate of 600 hours per year, and at the commercial rate of $750 per hour for 1991, so that's built in. Even so, the cost-per-hour for these long-term

solutions is a good bargain. It shows that the simulator acquisition has lowered the cost that we otherwise would have exceeded, for much less training, over a long period of time.

COMMISSIONER ROGERS: Just a couple of questions before you go on there. One is, you know, roughly speaking, it looks like you've got a constant cost that's being spread over varying numbers of hours and, therefore, when the hours go down, the cost-per-hour goes up and vice-versa, so that they more or less track, except when you get out to beyond '93 where the number of hours is constant but the cost-per-hour is starting to go down -- expected to go down. What -- for what reason? Why?

MR. RAGLIN: Well, that reflects the fact that we're paying off the lease-purchase payments for simulators. For example, we have no payment now for G.E. That was in there the last time we briefed. In '93 Westinghouse is paid for, in '94 B&W is paid for. It also reflects that we're projecting upgrades which we are working right now, will be completed by that time, and so the costs that are associated with them will not be included.

COMMISSIONER ROGERS: I see.

MR. RAGLIN: So, the costs are coming down.

Slide 19 -- (slide) -- is associated with current modeling capabilities of the simulators at the Training Center. All of the simulators have modeling that is typical of early generation simulators with two-phase flow capabilities. This means, in essence, that there are both better and worse simulators in use in the industry right now.

Our use of the simulators frequently involves demonstrations of extended scenarios and, unless these scenarios are very carefully bounded -- that means establishing pre-rehearsed suitable initial conditions and very careful monitoring what students do -- that they can reach limitations on existing simulator modeling.

For example, for the PWR simulators, anytime we get into a scenario which leads to a steam generator dryout, the modeling breaks down. And for the boiling water reactor simulator, if we try to do an anticipated transient without SCRAM, starting from a high-power level, again, the modeling fails us.

So, these limitations provide some limits on our ability to fully exercise the emergency operating procedures for each of the simulators, and also to conduct some human factors research activities which may depend on extended scenarios. So, as a result of these limitations and their effects on our programs, a

comprehensive plan to upgrade simulation capabilities was developed and is being implemented.

Although this plan will not address any deficiencies in the containment modeling, it should put the nuclear steam supply system modeling in very good shape. We expect that the outcome of the upgrade will be, for the thermal hydraulic modeling to support, essentially, any scenarios we would throw at it, up to the point of melting fuel. After that, all bets are still off.

COMMISSIONER ROGERS: Now, is this essentially a software program, or is there hardware involved, too?

MR. RAGLIN: It's both.

COMMISSIONER ROGERS: You have to replace the computers on some of these?

MR. RAGLIN: Right. Yes. In fact, I'd like to talk about that. Slide 20 -- (slide) -- in a nutshell, gives just what you were mentioning. The upgrade project has resulted in acquiring refurbished super-mini computers to upgrade the hardware platform.

In order to fix the modeling problems, we have to obtain and install and integrate a high fidelity thermal hydraulic code, one in which we have great confidence, one that will be stable, under very demanding scenarios.

The hardware platform to support that required better computing equipment than came with the simulators, and that's really why computers were acquired, and they are refurbished ones, so we got a pretty good bargain on the three super-mini computers that have been acquired during the last year.

Of the three that have been acquired, the one for the G.E. simulator and the one for the B&W simulator are now fully functional as part of the simulator configuration. That was a major task, to get from where we were to get to that position. The replacement computer for the Westinghouse simulator will be installed between now and May of '91.

Another part of the upgrade program was the design, development, and implementation of new instructor stations. These were needed to replace the dump terminals which served as the prior instructor interface with the older computers. These stations use a graphical interface that are intuitive, easy to use, and give the instructors a lot more capabilities than they had previously.

Another thing worth mentioning there is the development of an Input-Output override for the G.E. simulator, and keeping that capability on the B&W simulator with the upgrade. This means that the

instructors can modify the position of an indicator controller, a switch recorder, whatever, independent of the simulation calculation, and it opens the door for increasingly complex scenarios in the future, particularly with a better modeling capability. That's of some importance when we're training examiners, again.

The upgrade effort has been accomplished using in-house expertise to specify, procure, and install the equipment, at a substantial savings to the government. The G.E. and B&W simulators are now ready for the addition of the high fidelity thermal hydraulic code. The procurement for that code is expected to be completed in the next couple of weeks.

COMMISSIONER REMICK: What is that code, if you're free to mention.

MR. RAGLIN: I can't mention that.

COMMISSIONER REMICK: Okay.

MR. RAGLIN: It's procurement, but --

COMMISSIONER REMICK: Yes. Okay.

MR. RAGLIN: The Westinghouse modeling will be upgraded through the addition of a Westinghouse code, which will be delivered later in the year, and we did that through a modification to an existing contract with Westinghouse.

In addition to the high-technology enhancements

that are associated with simulator programs, there are some others that I'd like to mention. They're shown in Slide 21. (Slide)

One of these involves the acquisition of interactive laser videodisc systems for classroom training. These are systems which allow random access to any one of about 45- or 50,000 slides which were taken at some particular reactor facility, that allows taking surrogate tours. It gives you the look and feel as if you're walking around in the plant, while you're in your office, or in the classroom, or wherever.

We plan to integrate these into various classroom courses. We feel they will be of particular importance in that new course being developed for interns because they won't have seen equipment like this.

COMMISSIONER ROGERS: How many different plants do you have videodisc tours of?

MR. RAGLIN: We don't have them yet. We're projecting, oh, about the end of February we'll have, and we plan to get all that are available, in which we have interests. For sure, we will have at least two plants from different BWR product lines, and then one from each of the Westinghouse, C.E., and B&W plant. In all probability, we'll end up with maybe 15 different plants.

Classroom user equipment in high fidelity

thermal hydraulic codes are also planned for the future. Development, testing and planning of these has been going on, and continues to go on, so the exact mix of these in the classroom has not been determined, but it will involve some combination of the Relap 5 Desktop Analyzer, the light water reactor plant analyzer developed within AEOD, and a high fidelity thermal hydraulic code workstation that might come as a result of the code procurement.

High resolution projection TVs have been acquired to equip the classrooms, to display the laser videodisc information, the classroom computer simulations, and so forth.

Another thing worth mentioning is the ERD system and developing the ability to supply simulator data to the Emergency Response Data System. We've proved that that's possible. We intend to have all of the simulators at the Training Center capable of feeding data to ERDS. That data could then be used for testing and perhaps some drills.

MR. JORDAN: Certainly, some drills.

MR. RAGLIN: In addition to the acquisition of high technology training aids, the Training Center staff has been active in acquisition and configuration of components which can be used as hardware training aids.

This is described in Slide 22. (Slide)

A wide variety of components have been acquired over the last couple of years, and configured. By configuration, I mean disassembly and cut-away. We have several centrifugal and positive displacement pumps, pump motors, numerous small valves, heat exchangers, valve operators, and so forth. We feel that these training aids will be of particular importance for the training of new employees who have little or no experience in plants.

I'd like to show some pictures of a couple of these, if I could. (Slide) This first one shows a Training Center instructor pointing at the impeller of a boric acid transfer pump. As you can see, the pump and the motor have been cut away to expose the internal components.

Number 2 -- (slide) -- this shows a key fuel pump. Again, it's been cut away to expose the internal components.

Three? (Slide) This one shows a Fisher air operator and valve. The pointer there is indicating the local position indicator. Some of these components are functional, in that if it is an air operator, there's an air cylinder underneath and, with the controller, you can activate it and see the valve stroke, or whatever.

Number four. (Slide) Okay. This is a limit

torque valve operator. This is one of the functional ones. For example, it's plugged into an outlet, and then there's a little control box there. By activating the controller, you can see the mechanisms stroking the valve.

Okay. Number five, here -- (slide) -- that's a two-stage centrifugal pump which has just been cut away to expose the stages, and you can see the impeller.

And number six -- (slide) -- this is a small Terry turbine that was for a boiler feedwater pump. We got it and had it disassembled and, when you get up close to it, you can see many things. You can see the blading, you can see the seals, and so forth. And on the other end, you can see the trip and throttle valves, and so forth. These are typical of about 30 different components which have been acquired and configured at the Training Center. And, again, they will be available to all students who come for training at the Training Center, but we feel they'll be of particular importance for the new people who really haven't seen this type of equipment before.

COMMISSIONER REMICK: What about other training aids -- none hardware related, but I'm thinking with DeskTop Publishing, one is able to produce very effective training materials, graphs and diagrams and so forth.

What's your capability in that area, to produce good training aids.

MR. RAGLIN: Outstanding capability.

COMMISSIONER REMICK: Glad to hear it.

MR. RAGLIN: We do that in a big way, and we have many instructors who do that. We do our own graphics, using high technology equipment, and that's a regular way of life.

COMMISSIONER REMICK: Good.

MR. RAGLIN: Okay. At this time, I'd like to turn it back over to Ed Jordan for a summary.

MR. JORDAN: Thank you, Ken. We are proud of the Training Center and the way it's developed. I'm particularly pleased with the management involvement that we've had with the Program Offices at a senior level, that support, the training program, and the development of training needs.

I think the Training Center has been going through an evolutionary process that continues to evolve. It's not been static since I've been aware of its existence, and so I'm very proud of that.

The responsiveness now, to the recruiting and development plans, is certainly the next large effort that we will go through, and that will be described subsequently in another Commission paper.

We continue to seek to stay on the edge of the technology, to understand where it's going. We get support from research in that direction, and to provide training that is, in fact, consistent with the available technology.

Those are all the comments I have. Jim, did you have any?

MR. TAYLOR: That concludes the presentation.

CHAIRMAN CARR: Questions? Commissioner Remick?

COMMISSIONER REMICK: I assume that our simulators we don't certify and, if we did, what would you say? What would be the results if we had to certify our simulators like others do?

MR. RAGLIN: If we attempted to certify right now, we might fail on some of the things. After we have completed the upgrade, I would say that we could easily certify for the things that we have control over. I'm excluding the keeping track with the physical layout of the control room that the utility would have to do. From a capability standpoint, we will easily be near the head of the pack when we are done.

COMMISSIONER REMICK: With the all new meaning?

MR. RAGLIN: Yes.

COMMISSIONER REMICK: Very good. Okay.

I understand that there is consideration, if not already in effect, of qualifying non-power reactor inspectors. What do you do in the training arena for those people?

COMMISSIONER REMICK: There has been non-power reactor technology training that's provided in the last year. As one of the efforts that this working group to review inspector training requirements has achieved, is looking at the requirements for existing personnel, looking for existing personnel without requirements, seeing where the holes were.

One of the areas in which there will be a new section in the manual chapter defining requirements, is for non-power reactor inspection personnel.

COMMISSIONER REMICK: So, that doesn't exist yet.

MR. RAGLIN: There's training -- I won't say that it doesn't exist now. It will be more formal than it has before. There was non-power reactor technology training before, and will continue to be in the future. There will also be some other things that weren't done previously, that will be part of the qualification program for non-power reactor personnel.

CHAIRMAN CARR: Is that contracted out, or do you do it on-site?

MR. RAGLIN: It was contracted, not done at the Training Center. That was, I believe, done through the Idaho Nuclear Engineering Lab.

CHAIRMAN CARR: All right. Sorry.

COMMISSIONER REMICK: The training was contracted out --

MR. SPESSARD: The NRC staff participated in the development of that course, and taught in that course.

COMMISSIONER REMICK: Now, will you be doing it at the Training Center in the future, and when do you expect the revisions that you referred to being implemented?

MR. RAGLIN: Well, the plans for doing that particular course are the same as they were, to have the existing contractor to do that, and to have NRC staff provide NRC perspectives wherever that's necessary.

The new set of training requirements for non-power reactor personnel will be issued with the next revision of the Inspection Manual Chapter 1245. So, to make a guess, I would say, within the next couple of months.

COMMISSIONER REMICK: I see, but it will be-- continue to be done by a contractor.

MR. RAGLIN: Yes. Now, recognize, that's just

one complement. There are other things that non-power reactor inspectors will have to do, and they include some of the things that other inspectors have, fundamentals of inspection, and so forth.

COMMISSIONER REMICK: Will you use a particular facility at Idaho?

MR. SPESSARD: The last course that was taught, if my memory is correct, was in Region IV.

COMMISSIONER REMICK: I'm sorry?

MR. SPESSARD: Was in Region IV, presented it in that office, and had participants from around, although I could be wrong, but I believe that's where it was taught last.

COMMISSIONER REMICK: Are they using a particular facility at Idaho?

MR. RAGLIN: If I could find the course number -- just a minute. (Perusing documents.) Maybe we could close later on this.

COMMISSIONER REMICK: Sure, that would be fine.

MR. TAYLOR: We'll give you more information on that.

COMMISSIONER REMICK: I was quite impressed with the training activities. I'm very, very pleased to know that we have such extensive training. Do you invite the Commissioners down sometime, either as visitors or to

take the course?

CHAIRMAN CARR: I'm glad you would want to go.

COMMISSIONER REMICK: Good, good.

CHAIRMAN CARR: I had to go down to learn to spell BWR.

(Laughter.)

COMMISSIONER REMICK: I was at the location several years ago, but that's when the TVA simulators --

CHAIRMAN CARR: I think it would be worth going.

COMMISSIONER REMICK: Thank you very much.

CHAIRMAN CARR: Jim?

COMMISSIONER CURTISS: Yes. I only have a few questions. The facility is pretty much running at full tilt, that you're keeping busy down there, Ken, pretty much full time.

In terms of where you see the potential for backlog, I guess you -- from what you've described, you've got about 80 percent of the workload down there being done in response to mandatory, I guess, training requirements, and an additional percentage being done for intern training plus some, I guess, discretionary training that's available.

Where do you -- from the Headquarters perspective and from what you see down at the site, is

there a backlog in terms of a waiting time for people who need to get qualified, or who are currently qualified but need to move up? What's that pipeline look like, I guess?

MR. JORDAN: We get -- okay. We get backlogs in particular areas, and I guess the last one was the BWR technology course. And so we adjusted the schedule so that, in fact, we would work off the priority backlog.

COMMISSIONER CURTISS: But if somebody wanted to come in and get qualified in a BWR -- take a full course, for example, in G.E. technology, and they signed up, how long would it be until they got through the training, or to the training course?

MR. RAGLIN: That would depend on how many other people who have to have it to meet qualification requirements, were also competing for the same course. The earliest one on the list does not necessarily get to go.

Typically, where we have the most competition is for the courses of the full course series.

COMMISSIONER CURTISS: Okay.

MR. RAGLIN: The stand-alone one-week courses are usually readily more available.

MR. TAYLOR: And residents get a higher priority.

MR. JORDAN: There's a Program Office priority determination.

COMMISSIONER CURTISS: Okay.

CHAIRMAN CARR: Residents get a high priority.

MR. JORDAN: Yes.

MR. SPESSARD: We have on the street a schedule for FY 91 and FY 92, of every course we teach or coordinate, and that's what the training coordinators, and regional managers, and Headquarters office managers use to get their people to training.

COMMISSIONER CURTISS: Okay.

MR. SPESSARD: We routinely have to move this somewhat, and Ed just mentioned the BWR full course series. We had 48 people who wanted the first course in January -- and we had a course scheduled in January and another one in August -- and in checking, the numbers for August looked high. So, in essence, what we've done is, we've put in a whole full series, and we've had to back-out some other things that were scheduled, and that was fully coordinated with the Program Offices and the regions to do that, but we said we could only do it on a one-time basis.

COMMISSIONER CURTISS: I notice in your --

CHAIRMAN CARR: Let me go back on that a second and ask it a different way. Is training funds-limited,

space-limited, instructor-limited, time-limited, or there are no limitations?

MR. SPESSARD: Oh, God, you don't ask me that because --

(Laughter.)

COMMISSIONER CURTISS: You ran into that one.

(Laughter.)

CHAIRMAN CARR: Well, I mean, that's what we're here for.

(Laughter.)

MR. JORDAN: To meet the needs of the Program Offices, sometimes we have to cancel things in order to meet what I'll call higher needs because the capacity of the staff is somewhat limited. And --

CHAIRMAN CARR: So, instructor-limited.

MR. SPESSARD: Instructor-limited.

CHAIRMAN CARR: Okay. You don't have enough instructors to teach another course for the whole full series then?

MR. SPESSARD: A typical three-week course, for example, will involve three different instructors, and two-week will be three different ones. And so that severely taxes the staff in terms of what they --

CHAIRMAN CARR: Okay. If I solve the staff problem, would I become a space-limited?

MR. SPESSARD: No, we're getting space. We continue to get space as we need it. In fact, we've got negotiations --

CHAIRMAN CARR: And you're on a one-shift basis?

MR. JORDAN: If you push away one impediment, eventually you reach another but, for the foreseeable future --

CHAIRMAN CARR: It's instructors.

MR. JORDAN: -- it's instructors.

CHAIRMAN CARR: So, you've got space, you've got -- you can go on two shifts if you had enough instructors.

MR. RAGLIN: We do that for some of the things. For the classroom courses, rarely do we have one of those on swing shift -- occasionally, it happens. For the simulator courses, almost every time we do them we'll have a day shift and a swing shift course because we're trying to finish a full course series, and the Program Offices and the regions are trying to have us finish the series so these people can go off and do other things, and so we are trying to finish them within roughly a calendar quarter, which dictates that we run day shift and swing shift. That takes -- if we start with 24 people into the first course, 24 people into the second

course, by the time we get to the simulator courses, we're down to six-person courses. So, using the day shift and swing shift to handle the first course for the first group of six, then we've got to do the same thing for the second group of six, third group of six, fourth group of six, and a second course. So, it's -- for the simulator training, it's days and swings all --

CHAIRMAN CARR: Well, real assistance in the instructor area comes in blocks of three then, huh?

MR. RAGLIN: It depends on which technology --

MR. SPESSARD: There's one on the PWR side, and one on the BWR side.

CHAIRMAN CARR: Okay. Excuse me.

COMMISSIONER CURTISS: Okay. Do you -- you mentioned that as time goes by, you find that you've got -- as you did with the BWR full course, you have more people that sign up, and you adjust the availability of programs. You're able to report, when I looked at it, in the reactor technology slots, it looks to me -- and I'm on page 4 of that Annual Report -- in looking at the regional requests, Region I's technology slots from FY 87 to FY 90, have almost doubled, and Region II's have almost been cut in half, and the other three regions are pretty steady. Is there a -- obviously, not a steady input from Regions I and II in terms of how frequently

they request training for reactor technology slots. Is there something going on in those two regions that explains the doubling in one case and the reduction in half in the other?

MR. TAYLOR: More new people in Region I.

COMMISSIONER CURTISS: Okay.

MR. TAYLOR: I might take a shot at that, I think turnover is higher --

COMMISSIONER CURTISS: Okay.

MR. TAYLOR: -- and it has been both because more of those people have been hired in Headquarters, they've had the movies here, we do a lot of actually regional hiring, but then the other is the loss, losses are high, but where hiring has been higher. The other regions have been -- have had less hiring.

COMMISSIONER CURTISS: Okay. Those are the only two that kind of jump out over the four years, one went up significantly and one went down precipitously.

From the standpoint of, Ken, where you have requests for new program training, do you have a backlog of requests in that -- where either the Headquarters or the regions are requesting new programs be developed, that you are working off, or where do we stand on that?

MR. RAGLIN: Well, it's somewhat of a continual process and a continual dialogue. We have the regularly

scheduled meetings of the Training Advisory Group. Below the level of the Training Advisory Group, we have certain contacts that our staff discusses things with the other cognizant staff. So, typically, we're not surprised, and typically we're always working on something new that needs to be done to modify an existing program, or to add a new program in response to some changing need. So, we see it just as a continual process.

COMMISSIONER CURTISS: All right. Let me ask just one final question. When the Commission, or the agency I guess, establishes a new program, either at the Commission level through a regulation like fitness for duty, or Part 20, or maintenance or what have you, or through NRR with EDSFIs, or maintenance team inspections, or EOP inspections, what process do we go through in terms of evaluating whether a training program is necessary in that particular area.

And then when you determine that we need a training program for a particular area where there's a new set of requirements, or a new initiative, a new generic letter, what have you, how long is it from the time that that requirement is placed on the books until when the training program is in effect and the people who will actually go out and do the training -- and do the inspections, have been through the training? Can you say

a word or two about how that process works?

MR. RAGLIN: Yes, I think so. Again, a continual dialogue with the Program Office is one good way to know about these. Another thing that is as a result of this working group's review, inspector training requirements, is a recommendation that future new training requirements for new inspection procedures and temporary inspection procedures flag any unusual or special training that the individuals need to get in order to do that particular inspection. So, there's another check on the system built in now, that wasn't there before.

From the standpoint of being responsive, it depends, of course, on what's desired, and what mechanism we have to choose. If the Program Office wants something that we are able to accommodate through the use of one of the two task order contracts, then we're talking maybe a couple of months, from the time they come to us, we work up a Statement of Work, and make it happen. If it's something that can't be accommodated through one of the two task order contracts, then we have to go out with a competitive procurement, or even a sole-source procurement, then we're talking usually in excess of six months. And if it's for a company that hasn't done whatever it was that was being requested before, tack

onto that the time for them to develop it before the first presentation, so, that could add up to a year.

MR. TAYLOR: It's really covering courses that aren't within the staff that's there and, therefore, contracted courses. That's what you're talking about, isn't it?

COMMISSIONER CURTISS: Right.

MR. TAYLOR: Amends what it is.

COMMISSIONER CURTISS: Take a recent example like EDSFIs, where the inspections are starting up now around the regions, would you expect that the people who are actually out doing the EDSFI inspections will all have the training before they do any of those inspections, or is there an overlap where we are getting them out and doing the inspections and developing the training sort of in-tandem?

MR. RAGLIN: I would expect that for the EDSFI, given that two courses have already been given, that those people will have already had the training when they go out there, and there may be a rare exception to that.

COMMISSIONER CURTISS: In general, that's the objective, where you have a new program or activity, to have the people trained before they go out and actually do the inspections?

MR. RAGLIN: Yes.

MR. MIRAGLIA: May I expand on that? Frank Miraglia, NRR.

That's a good example. I think, as you can see, we're getting better at planning that. Certainly, one of the things that NRR did very early in its new generic requirements, we said, "We're not going to do inspections until we get a temporary inspection out, and give some guidance relative to new generic issues". The Training Group has indicated when you do that, and when you put a temporary instruction out, we ought to look to see do we need new training requirements.

Some examples of that, EOP inspections required some kind of training. We did that on a crash basis because we were interested in doing that, but that was something that got worked out. Fitness for duty is something that's been recognized. We identified the TI, what kind of training, did some pilots, and we're working that into the program.

When we started the maintenance team inspections, we did that in a similar kind of way, perhaps with not as much lead time. From that maintenance team inspection concept, we saw the next area, the electrical inspections. We need to do that. We need to plan that a little better. And as a result, we've had team leader training -- two sessions. I think

there's another session sometime the first quarter of this year, or early in the second quarter of this year.

So, I think we've recognized that. In the past, we hadn't done as good a job on it as we could have, and I think the -- you know, the future aspect, we'd do it up front, and we're getting better at it.

CHAIRMAN CARR: Commissioner Rogers?

COMMISSIONER ROGERS: I'm just a little puzzled about the length of the reactor technology full course series. Your Annual Report, on page 2, really lists three parts that add up to six weeks, and you described some components that added up to seven weeks, and then on page 6 in your Annual Report, you say the cumulative effect of these changes -- this is adding the EOP simulator course part and some other things -- will now require 13 course-weeks to accomplish rather than eight course-weeks. So, that's six, seven, eight -- there's only --

MR. RAGLIN: There's course-weeks and there's course-weeks. There's course-weeks from the perspective of the student, and there's course-weeks from the perspective of the Training Center.

A student goes to -- last year, a student went to a three-week, plus a two-week, plus a one-week. So, that's six weeks that that student was involved.

COMMISSIONER ROGERS: Yes.

MR. RAGLIN: Looking at class size, our average was around 18 for G.E. and Westinghouse, for the last couple of years. So, we had to give three sets of simulator courses. We've got three weeks, plus two weeks, plus three weeks. That's where the eight came from. Okay.

COMMISSIONER ROGERS: All right.

MR. RAGLIN: Things have changed now. More people have to have the full course series, plus there's an additional week to the full course series. Since more people have to have it, the class size spills up to 24. So, we still have three weeks with 24 people, plus three weeks -- or plus two weeks with 24 people. Then we've got eight --

COMMISSIONER ROGERS: Okay. I see what the problem is.

MR. RAGLIN: -- weeks of six people.

COMMISSIONER ROGERS: I see what the difficulty is. All right. Good. The -- a couple of points in your end report that I had a question about -- what the substance of this replacement nuclear parts course was-- that's also referenced to in your presentation. What was the major thrust of that course?

MR. RAGLIN: That was a seminar to cover

procurement of electrical and mechanical replacement parts, including commercial grade items for safety grade Class I, II and III systems at power plants. Topics included classification and types of components, code materials requirements, and applicable codes, and so on.

COMMISSIONER ROGERS: About how many of our staff participated?

MR. RAGLIN: I don't have that number on the tip of my tongue.

COMMISSIONER ROGERS: You don't have it. I'd like to know it sometime.

MR. TAYLOR: I could get back to you. We'll get back to you.

COMMISSIONER ROGERS: Right.

MR. RAGLIN: Twenty-six.

COMMISSIONER ROGERS: Twenty-six?

MR. RAGLIN: Yes.

COMMISSIONER ROGERS: Twenty-six. And where were they --

MR. SPESSARD: It's in the Annual Report.

COMMISSIONER ROGERS: Oh, I missed it.

CHAIRMAN CARR: It's in the back.

COMMISSIONER ROGERS: Oh, okay. And where do they come from? Are they from Headquarters, from the regions, or a mix, or --

MR. RAGLIN: Yes, sir.

COMMISSIONER ROGERS: Ah, ha. Yes.

MR. RAGLIN: Let me read it right. We had --

COMMISSIONER ROGERS: Okay, it's in the back.

MR. RAGLIN: -- three from Region I, two from Region II, 14 from Region --

COMMISSIONER ROGERS: Okay. Well, all right, it's in the back. I can just check it off from there. All right. That's an area that still keeps popping up in some ways, and I'm just curious as to -- do you expect to do more with that, or is that the end of it? Will you repeat that course?

MR. RAGLIN: If the Program Office wants it.

MR. SPESSARD: If NRR requests that, they requested that and we coordinated with them and our contractor to put that on.

MR. RAGLIN: If they want another one, it's not a problem.

COMMISSIONER ROGERS: I see. Okay. On page 14 of your slides, risk-based training perspectives, the senior management perspectives provided to the TTC staff. What were some of the key items there in those perspectives?

MR. JORDAN: Okay. That was Tom Early and myself that went to the Center and we're communicating

with the training staff about how we viewed the application of the risk type considerations in the regulatory framework, and how important we felt it was for them to convey to the students, the principles involved.

And so we were really there, I would say, in a sense, to wave a flag and to indicate that senior management really is serious about communicating to the inspector level and to the reviewer level, the benefits of identifying risk perspectives, understanding accident sequences.

COMMISSIONER ROGERS: I see. Good. Okay. This components -- hardware training aids components additions, do you have adequate space for that activity?

MR. RAGLIN: Well, the -- in the introduction, Ed mentioned 32,000 square feet. That includes some additional space on another floor that we're very close to getting, with GSA. And the reason we're doing that is, one of the classrooms on the second floor is being used as a training aid display area. And so we've got some of them in the back of existing classrooms, we've got some of them mounted along various walls throughout the Training Center, and then we've got many of them in one consolidated area.

COMMISSIONER ROGERS: Is your space, the kinds

of space you have available, a limitation on what kinds of components you can introduce?

MR. RAGLIN: Yes.

COMMISSIONER ROGERS: Well, I mean, obviously, to some extent, but I mean are there some things that you'd really like to have, that you can't have in there?

MR. SPESSARD: We could have had an MSIB. In fact, we had a whole surplus list of equipment, and the Training Advisory Group discussed this, and we even discussed the possibility of having a location close to the Center that was within walking distance, and the view expressed was that that would be -- turn into a museum, and we wouldn't use it. They want the equipment in the classrooms, so that basically limited --

COMMISSIONER ROGERS: Of course, your facility is pretty much, you know, an office --

CHAIRMAN CARR: Standard office building.

COMMISSIONER ROGERS: -- office building, classrooms, and things of this sort, and now you're starting to bring in hardware. That poses some different problems.

MR. JORDAN: Getting it into the top floor would be a problem.

COMMISSIONER ROGERS: Yes, right.

MR. RAGLIN: They built the building well,

though.

COMMISSIONER ROGERS: You could get part of the basement, if you don't have it.

MR. RAGLIN: Yeah.

COMMISSIONER ROGERS: Well, just also wanted to reinforce Commissioner Remick's suggestion that you try to weave the principles of good regulation into your program someplace because it seems to me that that's a good place that they can be used effectively.

MR. JORDAN: Maybe -- Denny Ross, would you like to make some comments about the reactor safety course that we're contemplating?

MR. ROSS: Denny Ross, AEOD. We did have a prospectus for this course. The prospectus is about seven pages long, and it's being evaluated by Research.

What we wanted to do is start at the fundamentals of postulated accidents -- what are the traditional regulatory assumptions on loss of coolant, transient, without SCRAM, and so on. And to this end, we call it the -- General Counsel representative and myself spent quite a bit of time in a couple of the litigated hearings a few years ago, on what a credible scenario is, and we thought that might be a good starting point, what does credible mean? I think we can assume what a scenario is, but these are not well defined, and it's

sort of like folk lore, and then we would proceed to a development of a severe accident, and trying to illustrate with hand calculations how long would it take the boiler to run dry, the coil to heat up, how many curies, or how many pounds, or how many kilograms of fission products in the core, and what's the harm to people, and what percent might get released into the containment, and what are the processes in the containment? If they leak, how do they get transported away downstream, to the traditional cow tied to the fencepost, and what are biological processes? What does passable weather conditions mean, again, focusing on hand calculations, and then we finally get to the point that was mentioned earlier, the so what? That is, what's the risk to the person, and we've emphasized the safety goals. The last half of the last day, in fact, is the wind-up of the Commission's safety goal, the severe accident policy statement. And when we get into the safety goal and the two quantitative health objectives, that would certainly bring up the concept of relative risk.

As far as -- we had not specifically planned any other comparative risk. There was a study about ten or twelve years ago, know as the KNAES (phonetic) study, which I don't think was widely published, by the Academy,

on risks of nuclear and alternate energy systems, which is, I think, going to be updated by the IAEA. If it is, and it needs to be, we could certainly work that in. But the topics that were envisioned, we don't believe are being caught anywhere else and, with time, people who have gone through these things, like the Appendix K hearing, Appendix I hearing, the ATWAS problems, and the TMI and Chernobyl problems, we'll all get pensioned off somewhere, so we've got to have a passing the baton somewhere, and we're hoping the safety course does it.

COMMISSIONER ROGERS: That sounds like a very good idea. That's a big problem, of how to try to maintain that institutional memory on some of these things, and the training course background materials might be a good way to record that and have it available for th future. Yes.

Has anybody thought of providing some of the new students -- students who are new employees to NRC, with a handbook of NRC acronyms?

(Laughter.)

That might help them to find out how to live for the first six months they are around this place.

MR. SPESSARD: Commissioner Rogers, you should know that each individual that is an intern -- okay-- within the office, will have their own individual

development plan, a sponsor -- they will have things of that sort. We didn't discuss that here, but they will have that.

COMMISSIONER ROGERS: I just want to say that I visited the Center a couple of years ago, and was very impressed with what I saw then, and I can see a great deal of progress since then. And it seems to me that this effort is really a first-class one, there's no question about it. I know the last presentation -- I think this was nearly two years ago -- to us, whenever it was, I complimented you, I think, and I think that you certainly have continued on a course of very fine development, and I think we all should be very proud of what's been done -- excellent facility, excellent programs.

CHAIRMAN CARR: Let me first suggest then, following up on the suggestion that when you get those students' critiques, you have them write down their supervisor's name and address, and you send him a form letter about three months later and say, "Hey, did we accomplish anything", and he can send that back to you. You might get some input from that that will help. It has worked in other school systems.

I'm not sure in my question on -- my question really was, have we budgeted enough resources to get the

necessary training done, because I think training is a critical part of our operation here, and are we providing 28-man staff -- three of those are, I guess, non-training people there -- so, you've got 25 people training I don't know how many thousands, but that's a pretty big load. And I guess the basic question I ask, are we really trying to find out, are we getting the job done, or are we not?

MR. JORDAN: We're matching the load, and we're seeing the load increasing, and we've got to match the increasing load.

MR. TAYLOR: We've looked at the addition, potential addition, of some FTEs there. I've got to be very careful because that is a -- when the FTEs are there, then that's a very remote location that, as you build up, you have to build up very carefully, and that's why we're trying to match it with the workload for the permanent staff. And of course, it is a combination of the permanent staff plus, where appropriate, a contractor conducting courses. It's a combination.

CHAIRMAN CARR: Well, it's important we do get the training done because --

MR. TAYLOR: No question, and as we --

CHAIRMAN CARR: -- there's no doubt in my mind that if you need three more people down there, they are

probably more useful to us in the overall long run than trying to put three people somewhere else, if you can really substantiate them, but that was a basic question, and we've got enough travel cost -- we're not travel cost limited on training.

MR. TAYLOR: No, no, we're not.

CHAIRMAN CARR: Okay. So, I'm going away thinking that the real short pole in the tent is instructor workload.

MR. JORDAN: Yes.

CHAIRMAN CARR: Is that what you want to leave me with?

MR. JORDAN: Yes, sir.

CHAIRMAN CARR: Okay. In September, '89, the Commission directed the staff to provide adequate training capabilities in the area of fuel cycle and reactor physics safety associated with fuel cycle criticality. What's the status of the fuel cycle course that the TTC was developing last year to emphasize criticality safety?

MR. RAGLIN: Okay. There is a fuel cycle technology course that will be in the next revision of our syllabus of courses. It's presently under development, scheduled for presentation in May of '91. It's being developed by the previous Training Center task

order contractor, and it will be presented by the new task order contractor. This will provide familiarity with the fuel cycle, mining, milling, conversion, enrichment, fabrication. Course topics include uranium mining and milling, uranium conversion of natural UO3 to UF6, uranium enrichment and uranium fuel fabrication and scrap recovery. So, we've been working since the last briefing, with NMSS, in the co-development of this course, and it's scheduled to go on-line in May.

CHAIRMAN CARR: The emphasis on that thing, as I remember, was supposed to be on criticality safety, and that's close to my heart recently.

MR. RAGLIN: Okay. Criticality safety, that was one of the issues that was brought up last time and, as a result of some difficulties at NFS-Irwin and some existing problems, the Program Office felt that it took a real event and much follow-up, to focus action on this particular issue. We've identified a couple of criticality safety courses, to which some NMSS people have attended.

The Program Office has not considered that to be the total answer to the problem because that's really only addressing one part of the issue. The other part of the issue is a recognition problem on the part of the staff. NMSS has increased its expertise by recruiting an

expert in this area, that's on their staff right now, and I'm advised that the Program Office may be back to us for some further work in this area. So, from our perspective, we've got a technology course.

CHAIRMAN CARR: But your --

MR. JORDAN: Excuse me. The fuel cycle course that you describe does emphasize criticality safety as one of the major elements of it though, does it not, Ken?

MR. SJOBLOM: Could I address that, perhaps?

MR. JORDAN: Yes.

MR. SJOBLOM: Glen Sjoblom, NMSS. Mr. Jordan is correct. The various elements of the fuel cycle where criticality safety is an issue, those technical aspects of criticality safety that are involved in those aspects of fuel cycle, are going to be covered in that course.

Last year, we pointed out to the Commission that there are existing training courses that are given at the University of New Mexico, and our people in NMSS, in fact, have participated as instructors in those courses, over a number of years. Those are what I would call beginning courses.

What Ken and I had talked, with regard to, that he mentioned just recently, is a belief that we need to enhance the ability of our staff in the regions, to recognize when we need to press on with more efforts in

the regard to the licensees, recognizing when things aren't meeting the double contingency principle, for example, is something our Headquarters people have been able to do. Though we have had some turnover in this area, we were able this past year to hire a very expert person. In fact, he's the chairman of the ANS Criticality Division, and so he is an excellent addition to the staff.

We want to, nevertheless, to augment the knowledge of the region-based people as well, as well as increasing involvement of our Headquarters expertise with the regions. We're trying to develop something that will go towards improving the -- everybody that does inspections at fuel facilities, to help us to continually put attention on that area.

CHAIRMAN CARR: Okay. My first question is going to be, this year?

MR. RAGLIN: Yes.

CHAIRMAN CARR: I think that answers your question because the direction was late '89, and the course is about to come into being, right?

MR. JORDAN: Right.

CHAIRMAN CARR: A follow-up on Commissioner Curtiss is, the Commission's recent promulgation of Revised Part 20 imparts, as a large responsibility, to

ensure that our inspectors and license reviewers are adequately trained on the new rules. Is the TTC going to do that for us, or who's taken that task on?

MR. TAYLOR: We're just setting that up. I think we gave you a memo, and there is a group -- Hugh Thompson is working with that group. I'll have to give you some status on where they're --

CHAIRMAN CARR: Well, I think it is -- it's going to end back in your bailiwick though, finally, huh?

MR. RAGLIN: Maybe ultimately. The training will involve a number of sessions at different locations. Research has the lead. It's a combination of Research, other Program Offices, and Training Center. We will be active participants. The details are not all yet worked out.

MR. TAYLOR: We'll have to give you as we work on that problem.

CHAIRMAN CARR: Okay. The Inspection Manual, Chapter 1245 had a section on training materials and fuel cycle inspectors, and then there were some supplemental courses listed for those. Are you considering deleting those, or are you going to leave them in there? I see-- I see -- go ahead, Glen.

MR. SJOBLOM: Glen Sjoblom, NMSS. The qualification of our materials people is done in stages.

There are certain mandatory courses required for initial qualification. Those are listed in the mandatory section. The supplemental courses are required as they progress beyond the initial qualification.

Courses such as MORT training, for example, are in the supplementary list, while courses in the OSHA orientation are in the mandatory list.

CHAIRMAN CARR: But you're going to leave the list in the manual?

MR. SJOBLOM: The list absolutely is up-to-date as we know it today.

CHAIRMAN CARR: Okay. The advanced health physics course and the advanced internal dosimetry courses weren't offered until FY 1990 -- H-401.

MR. RAGLIN: We had an internal dosimetry --

CHAIRMAN CARR: I think these were the advanced courses. Well, I guess the question is, are those really still part of the curriculum, or have you deleted them?

MR. RAGLIN: The H-401 course, which was previously called advanced health physics, will be developed probably this year. It will have a new name. I don't remember whether I wrote that down. (Perusing documents.)

CHAIRMAN CAPR: I guess my problem really is, with the new Part coming, are you going to get a new load

on those courses?

MR. TAYLOR: Do you want to get back to them on that?

MR. RAGLIN: The H-401 course, formerly called advanced health physics, will be now called the health physics topical review course. It will be a three- to five-day course given by the Training Center staff and invited lecturers.

CHAIRMAN CARR: Okay.

MR. JORDAN: But the question of whether or not the Part 20 change increases the load, I think --

MR. RAGLIN: Part 20 is not factored in right now.

CHAIRMAN CARR: Okay. You may want to --

MR. RAGLIN: In internal dosimetry, we have a course for internal dosimetry-whole body counting that's an active course right now.

CHAIRMAN CARR: Okay. I guess -- do you have any feel for how much the training is a motivating factor in retention and performance within the agency? Do we get any -- you know, you're always training, and you like to feel like that your money is well spent and something comes as a result of it. I guess the question should be, first, are we losing people because they can't get training, or --

MR. SPESSARD: Well, we're certainly hoping, from the intern programs coming up, that that will be an attraction, that we can guarantee a path of training.

CHAIRMAN CARR: Well, we don't require any obligated service for our training, I'm sure.

MR. SPESSARD: No, we don't.

CHAIRMAN CARR: And so if we're going to put a lot of effort in training interns, we're hopeful that they'll stay with us, I guess.

MR. SPESSARD: Yes.

MR. JORDAN: I can give you an experience that we have with our Operations officers that's relevant. Since we essentially made our operations officers in a more professional status and established training requirements in order to qualify, I think our retention has been better.

We do have a handshake arrangement that we expect two years of Operations Center service out of --

CHAIRMAN CARR: After you provide the training?

MR. JORDAN: -- if we provide the training, and that has held up extremely well, and those people have gone on to other offices quite successfully. So, that particular feature has, I think, been very beneficial.

CHAIRMAN CARR: How long is that training series?

MR. JORDAN: They take the full course series for both types of reactors, for both Bs and Ps. So, we spend a lot of resources.

CHAIRMAN CARR: Well, that's 16 weeks or something?

MR. SPESSARD: We also have the qualification board check out on this.

MR. RAGLIN: I think a lot of the changes that are on the verge of coming to pass right now, will serve as a positive motivating factor for a lot of the NRC staff. Training requirements have changed for some positions, and the opportunity to get some of this training position, some of these people, such that they can now compete for some jobs that they previously would not have competed well for, there'll be a better interchangeability of the staff, particularly from a reactor technology knowledge standpoint, as a result of the plans that are underway right now.

CHAIRMAN CARR: What's the instructor retention capability? Are you having good luck keeping instructors?

MR. RAGLIN: We have lost an average of about a little over one per year, over a ten-year period. And they've gone different places. The last three that have left, have rotated to other positions within the agency.

CHAIRMAN CARR: We didn't lose them, but you lost them to something else.

MR. RAGLIN: Right.

CHAIRMAN CARR: And where is your source of instructors come from?

MR. RAGLIN: Various. We -- the last two we got were from the resident inspection program. We got a senior resident from Region I and we got a resident from Region III, to fill the last two positions. We can compete pretty favorably, even when we go outside the agency in advertising. It's normally not a problem of finding one, when we're looking. We see a lot of resumes that we can't do anything with.

CHAIRMAN CARR: I'd hope you'd pass them over here to these guys that are looking for people to go out and do examinations. They may be the same kind of guy.

MR. RAGLIN: Yeah, we do that, and they are pretty much the same kind of guy.

CHAIRMAN CARR: Any other questions?

COMMISSIONER REMICK: Just one comment, a follow-up on the simulator and systematic approach to training. We require certification of simulators, the licensees, and we certainly strongly endorse a systematic approach to training. So, to the extent that those same standards apply to either our equipment or our training,

I think we should look very carefully at trying to have the same standards, so that you as instructors can look other instructors in the industry in the eye, and our technical staff can look at their peers in the eye and say, "We know what it's all about, we're doing something equivalent at least", so a final point I'd like to make.

MR. SPESSARD: I'd like to comment on something.

CHAIRMAN CARR: Yes.

MR. SPESSARD: Our plan for upgrade and in working with Research, does include what I'll call benchmarking our simulators against the best estimate codes. So, our plan is to look at how good the simulator is before modification and after modification, against the best estimate codes, so we will know that.

MR. RAGLIN: The transients that are going to be compared or have been compared, are inclusive of that list, in the simulator certification requirements.

CHAIRMAN CARR: Well, I'd like to thank the staff for this informative briefing on the current status of the NRC's Technical Training Programs. Based on what we have heard, considerable effort and initiative have gone into making NRC training a valuable part of creating a credible cadre of NRC inspectors and technical reviewers. It is noteworthy that feedback from the staff

is positive.

Notably, the recent training provided in the area of irradiator technology and the development of a comprehensive health physics curriculum were well received by the staff. As we have heard today, additional effort is underway to further define and develop these training programs.

Initiatives to enhance staff awareness of major risk contributors are also very important. From our recent experience with the BRC policy and the off-site emergency preparedness issues at Pilgrim, I see the need for developing and integrating communication training for our technical staff.

I understand that remedial relations courses are offered, but I believe something more is needed to ensure that we effectively communicate with our licensees, the states, other federal agencies, Congress, as well as the interested public.

My philosophy is one that emphasizes the importance of not only doing a good technical job, but in being able to effectively communicate our efforts, no matter how technical, to those outside the agency who do not have the same specialized training and knowledge as the NRC staff.

Therefore, I would encourage you to incorporate

such communication training into your curriculum this year, and to plan for making this effort a part of the risk-based culture you have now incorporated into TTC courses. Please advise the Commission on your progress in this area.

With increasing employees as well as participation from the states, the public, and other interested and affected groups in the NRC's programs, I see a critical need in the years ahead, for NRC to continue to operate as an open agency that is not only willing, but extremely capable of communicating our mission, programs, and policies to others. I urge the staff to keep up the good work in the area of staff training.

Any additional comments from my fellow Commissioners?

(No response.)

If not, we stand adjourned.

(Whereupon, at 3:56, the meeting of the Commission was adjourned.)

CERTIFICATE OF TRANSCRIBER

This is to certify that the attached events of a meeting of the United States Nuclear Regulatory Commission entitled:

TITLE OF MEETING: BRIEFING ON NRC TRAINING CENTER

PLACE OF MEETING: ROCKVILLE, MARYLAND

DATE OF MEETING: JANUARY 3, 1991

were transcribed by me. I further certify that said transcription is accurate and complete, to the best of my ability, and that the transcript is a true and accurate record of the foregoing events.

Phyllis Young

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NRC TECHNICAL TRAINING PROGRAM

January 3, 1991

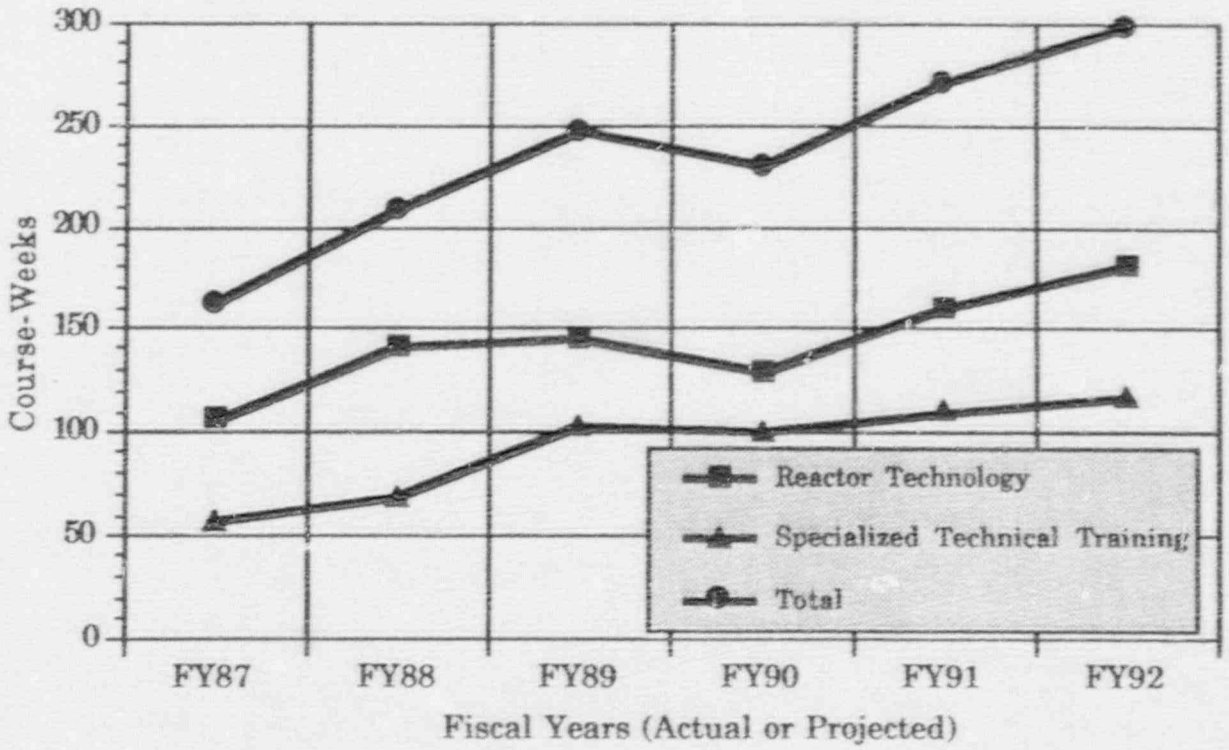
Edward L. Jordan, Director, AEOD
R. Lee Spessard, Director, DOA, AEOD
Kenneth A. Raglin, Director, TTC, DOA, AEOD

Contact: Kenneth A. Raglin
Phone: FTS 856-6500

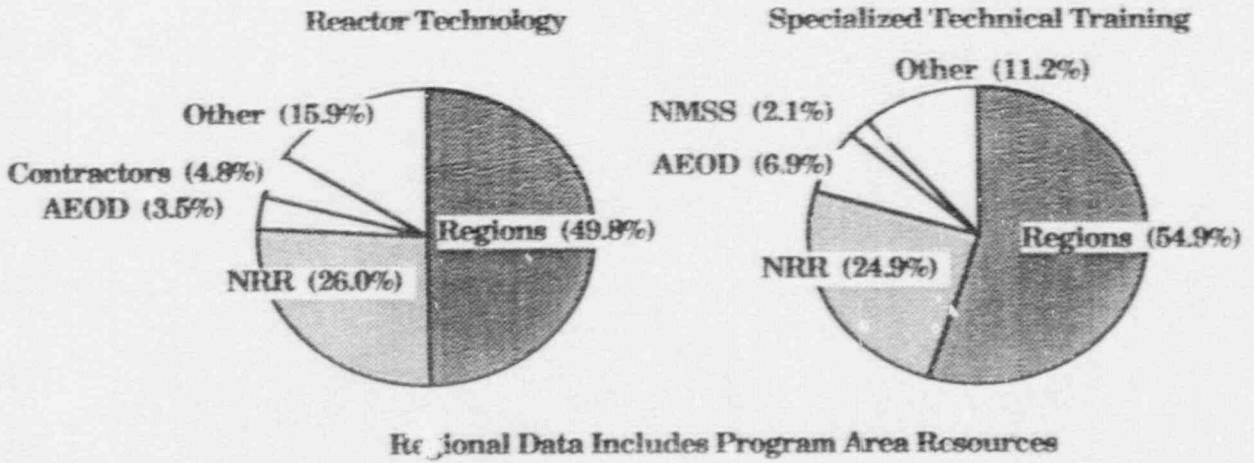
INTRODUCTION

- Last Briefing 9/89
- TTC Mission
- TTC Staff
- TTC Facilities
- How the Agency Determines Training Needs

COURSE-WEEKS OF TRAINING



DISTRIBUTION OF TECHNICAL TRAINING



Regional Data Includes Program Area Resources

TRAINING IN SUPPORT OF QUALIFICATION PROGRAMS

- Coverage of GE, W, CE, and B&W Vendor Designs
- Full Course Series
- Individual Courses
- Refresher Training for Inspectors and Examiners
- Other Specialized Training Such as HP and Engineering Support

TRAINING IN SUPPORT OF OTHER PROGRAMS

- Reactor Concepts Courses
  (OP - Orientation Program)
- National News Media Courses
  (GPA - Public Affairs Function)
- Reactor Technology Training
  (OP - PRA Technology Transfer Program)

SPECIAL REQUEST REACTOR TECHNOLOGY TRAINING

- Special Course on Browns Ferry Simulator
- Special Simulator Course for Mexican Regulatory Personnel
- Special Reactor Technology Courses (GE and W) (State of IL)

SPECIAL REQUEST SPECIALIZED TECHNICAL TRAINING

- Accident/Incident Investigation Workshops (HQ and Regions)
- Replacement of Nuclear Parts (NRR)
- Training for Specialized Team Inspections (Electrical Distribution System Functional Inspections)
- Site Access Training (NRR Canadian Contractors)
- Quality Assurance Auditor Courses (NMSS)

QUALIFICATION PROGRAM DEVELOPMENT

- Phased Plan for HQ Program Development
- Training Identified As High or Medium Priority Is Available
- Planned Review of Regional Positions
- Working Group to Review Inspector Training Requirements
- Training Advisory Group (TAG) and Technical Training Advisory Council (TAC)

SUPPORT FOR TECHNICAL INTERN PROGRAMS

- Reactor Engineer Interns
- Reactor Health Physicist Interns
- Nuclear Materials Health Physicist Interns

SUPPORT FOR RECRUITMENT, DEVELOPMENT, AND RETENTION OF NEW HIRES

- Expected Categories of New Hires: Technical Interns; Personnel with No Nuclear Experience; and Personnel with Prior Nuclear Experience
- Technical Training Must Be Available for All
- All Will Get Full Course Series in Reactor Technology
- Gradual Upgrade of Overall Staff Reactor Technology Knowledge

STAFF QUALIFICATION PROGRAMS

- Several Positions Covered by Office Letters (NRR Project Managers, Operations Officers, etc.)
- Examiner Training Covered by Examiner Standards
- Inspector Training Covered by Inspection Manual Chapter (Regions and Headquarters)
- Training Requirements for Some Positions Are Strengthened by Recent Commission Paper

TECHNICAL TRAINING PROGRAM CHANGES

- Full Series for Inspectors Involved with Reactor Operations
- Emergency Operating Procedure (EOP) Simulator Course Added
- Power Plant Engineering Course (or Equivalent Experience) for Most Positions
- Some Additional Training Required Following Qualification
- Regulatory Philosophy Refresher Course as Refresher Training

RISK-BASED TRAINING PERSPECTIVES

- Increase Staff Awareness of Risk Dominant Sequences and Major Risk Contributors
- Upgrade TTC Course Manuals and Course Materials
- Special Training for TTC Staff
- Senior Management Perspectives Provided to TTC Staff
- All Full Course Series after 1/1/91 Will Include the Perspectives

REACTOR TECHNOLOGY CURRICULUM DEVELOPMENT ACTIVITIES

- Normal Course Life Cycle Processes (Constant Upgrading)
- B&W Course Overhaul to Reflect B&W Simulator Systems
- Simulator Procedure Development
- EOP Flowcharts Development
- Computerized Exam Bank System

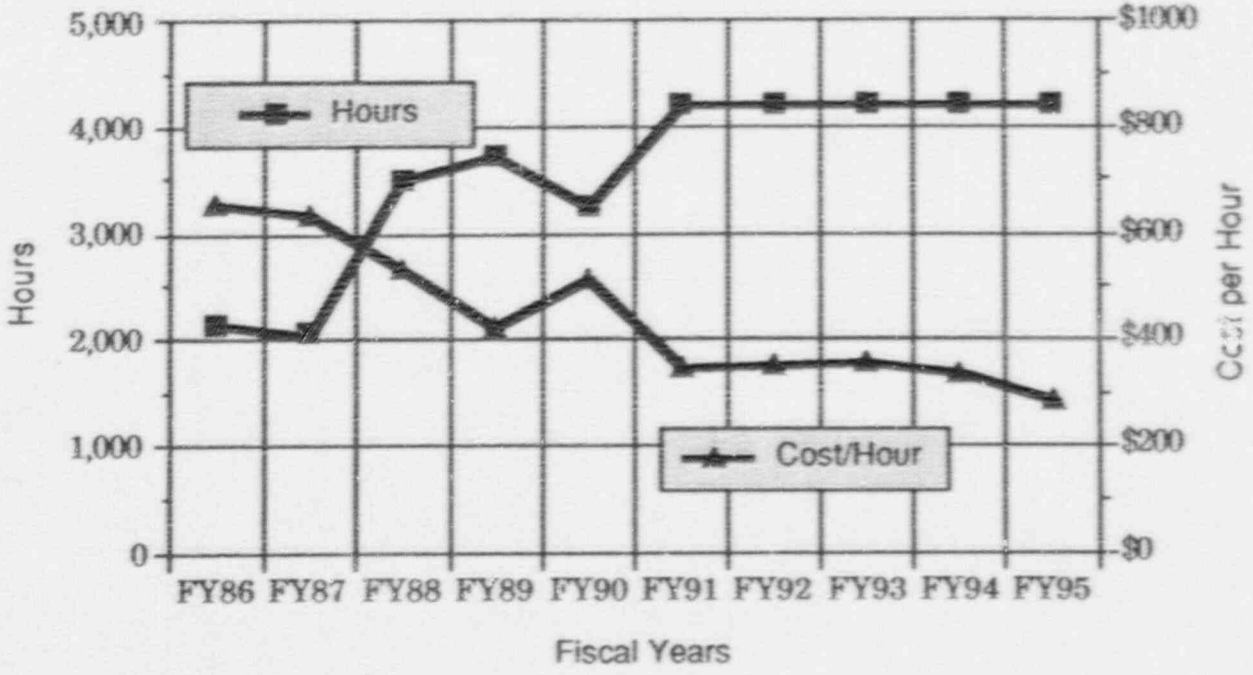
HEALTH PHYSICS CURRICULUM UPDATE

- Significant Implementation Progress
- Several Courses Were Developed and Presented during the Year
- Certain TTC Courses Are Available to State Personnel
- Certain GPA/State Programs Courses Are Available to NRC Staff
- All Courses Required for Initial Qualification of Nuclear Materials Health Physicists Are Available

SIMULATOR MANAGEMENT

- NRC Needs for Simulator Time (1500 Hrs. for GE and Westinghouse; 600 Hrs for CE and B&W)
- Long-Term, Cost-Effective Solutions for GE, Westinghouse, and B&W Designs
- Currently No Mechanism for Providing CE Simulator Training
- CE Simulator Procurement Underway As Approved by Commission

SIMULATOR USAGE AND COST



SIMULATOR MODELING CAPABILITIES

- NRC Simulators Have Modeling Typical of Early Generation Simulators with Two Phase Flow Capabilities
- Our Usage Typically Involves Extended Scenarios
- Exercise of EOPs and Some Research Are Limited by Modeling
- Comprehensive Plan to Upgrade Capabilities Is Being Implemented

SIMULATOR UPGRADE PROJECT

- Refurbished Super-Mini Computers Obtained to Upgrade Hardware Platform
- New Instructor Stations Designed, Developed, and Implemented on GE and B&W
- Input/Output (I/O) Override Available for B&W and GE Simulators
- GE and B&W Simulators Ready for Addition of High Fidelity Thermal Hydraulic Code

HIGH TECHNOLOGY TRAINING ENHANCEMENTS

- Interactive Laser Videodisc Plant Tours
- Of Particular Importance for Training of Technical Interns
- Classroom Simulations
- Classroom High Resolution Projection TVs

HARDWARE TRAINING AIDS

- Active Acquisition and Configuration of Components as Training Aids
- Wide Variety of Components Added during Year
- Of Particular Importance for Training of New NRC Employees with Little or No Power Plant Experience

SUMMARY

- Strong NRC Senior Management Involvement and Support for Technical Training Program
- Program Evolving to Maintain A Well Qualified NRC Staff
- Program Responsive to NRC Recruiting and Development Plans
- High Technology Enhancements Being Made

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

December 13, 1990

MEMORANDUM FOR: Chairman Carr
Commissioner Rogers
Commissioner Curtiss
Commissioner Remick

FROM: James M. Taylor
Executive Director
for Operations

SUBJECT: TECHNICAL TRAINING CENTER ANNUAL REPORT

The staff is scheduled to brief the Commission on technical training activities on January 3, 1991, and you will be provided briefing slides in advance of the briefing. Enclosed for your information is a copy of the Technical Training Center Annual Report for Fiscal Year 1990. AEOD has provided this report to agency senior managers, and I believe you will find it interesting reading in preparation for the briefing. The report contains more information on technical training than is typically present in the NRC Annual Report. I look forward to meeting with the Commission on this important matter.

James M. Taylor
Executive Director
for Operations

Enclosure:
Technical Training Center
Annual Report

cc w/encl:
SECY✓
OGC
ACRS

TTC Annual Report
Fiscal Year 1990

By Kenneth A. Raglin, Director
Technical Training Center

Contents

TTC Mission

The NRC Technical Training Center (TTC) coordinates with the NRC Headquarters Offices and Regions in the development and implementation of staff technical qualification programs. The TTC provides technical training to initially teach and continually maintain NRC inspectors, operator license examiners, reviewers, project managers, operations officers, technical managers, and other NRC personnel with the level of knowledge of reactor technology and other specialized technical training necessary to perform assigned agency functions. The TTC manages the operation, maintenance, and upgrade of full scope reactor training simulators and associated computer equipment in support of established training needs. The TTC is located in Chattanooga, TN but is part of the headquarters organization within the Office for Analysis and Evaluation of Operational Data (AEOD).

Reactor technology provided by the TTC consists of a spectrum of courses, involving both classroom and full scope reactor simulator training, covering the General Electric, Westinghouse, Combustion Engineering, and Babcock & Wilcox vendor designs. The core of the reactor technology training provided to support NRC staff initial qualification programs has been the reactor technology full course series consisting of a three week technology course, a two week advanced technology course, and a one week reactor simulator course. This full course series has been developed and made available in each of the US light water reactor vendor designs. A variety of other stand-alone reactor technology courses have been made available to support other parts of NRC staff qualification programs.

Specialized technical training provided by the TTC consists of a number of courses in engineering support, health physics, safeguards, and inspection or examination techniques. Specialized technical training is provided through two basic processes. One involves making a few slots to regularly scheduled courses available to NRC employees. Courses such as this typically contain students from a variety of organizations and are, therefore, not tailored to meet NRC needs. The other typically involves contracting to present courses which are attended only by NRC employees or selected contractors. Courses of this type are normally customized to best meet specific NRC needs.

Overall FY 1990 Statistics

During FY 1990, the TTC conducted or coordinated a total of 103 courses in the reactor technology areas and 76 more in the specialized technical training area. A total of 2,139 students attended TTC courses during the fiscal year, although a number of students in qualification programs attended multiple courses. These courses represent a total of 229 course-weeks, 129 of which were associated with reactor technology training and 100 of which were associated with specialized technical training. Of the specialized technical training totals, there were 17 slot-based courses involving 30 course-weeks and a total of 59 customized courses involving 70 course-weeks. Typically, course-weeks can be correlated to TTC staff effort or contractor dollars required to conduct training. All courses falling under the TTC program element and listed in the annual syllabus of courses are included in the totals given throughout this report. Detailed annual totals for all TTC courses can be found in Tables 1, 2, 3, and 4 at the end of this report.

Table 1 provides the annual reactor technology totals by course group. Table 2 shows the annual reactor technology totals by course type for the various reactor technology areas. Table 3 provides the annual specialized technical training totals by course enrollment type. Table 4 provides the annual specialized technical training totals by course type for the various specialized areas.

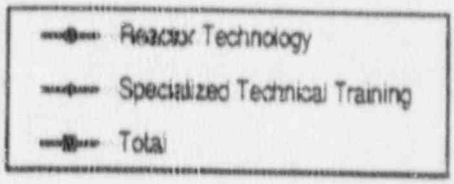
All courses presented by, coordinated by, or arranged by the TTC staff are included in the statistics of this report. The number of specialized technical training courses decreased somewhat because of the loss of some technical training previously available through other Federal agencies.

Course-weeks can be correlated to the staff or contractor level of effort required to conduct the training. Reactor technology course-weeks were down during FY 1990 because of substantial development work to achieve a risk-based culture at the TTC and the cancellation of a B&W full course series.

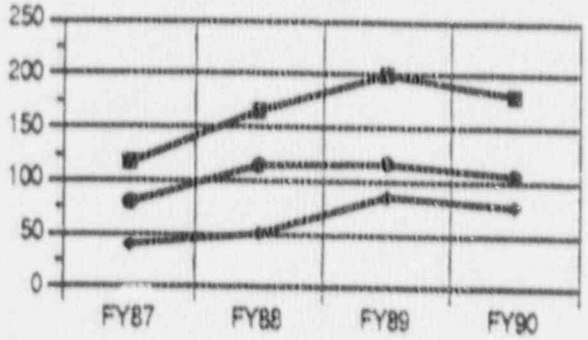
Students are counted each time they attend an individual course. NRC staff receiving formal training for qualification programs are, therefore, counted several times.

Statistical Comparisons

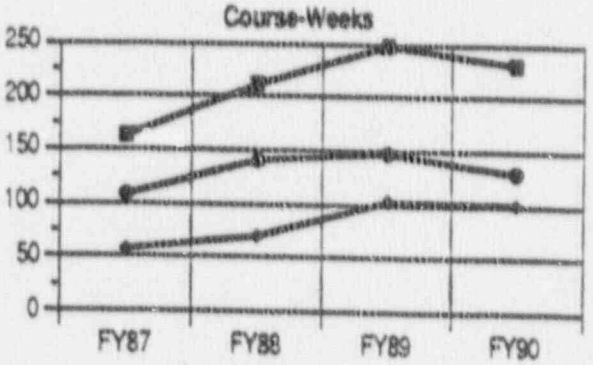
Comparisons of course, course-week, and student attendance data over the four year period of FY 1987 to FY 1990 can be viewed in the graphs which follow.



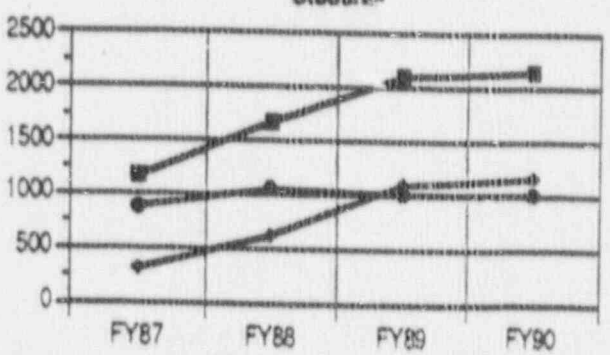
Courses



Course-Weeks



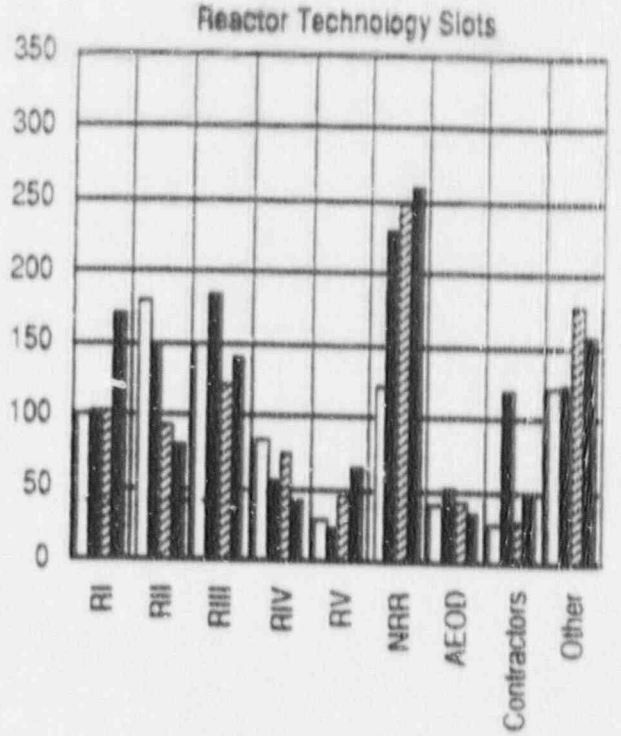
Students



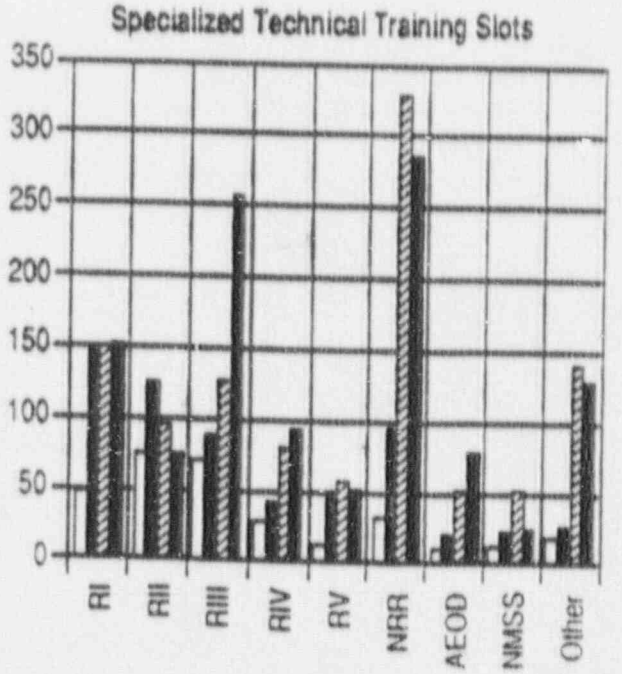
Distribution of Training Slots

The graphs to the right indicate the use of slots (training opportunities) by the Regions and largest Program Office users (on a slot-usage-basis) for reactor technology courses and specialized technical training courses over the range of FY 1987 to FY 1990. The source data for these graphs can be examined in detail by reviewing Tables 1, 2, 3, and 4 at the end of this report.

Reactor technology slots were split evenly by regions and other users. The slots represented attendance at training which varied from <1 week to 3 weeks. Students attending the reactor technology course series were counted for each course. Historical trends for major users can be seen by comparing the bars.



Specialized technical training slots were split approximately evenly by regions and other users. The slots represented attendance at training which varied from <1 week to 5 weeks. Students attending multiple courses were counted for each course. Historical trends for major users can be seen by comparing the bars.



Special Request Training

In addition to technical training courses in support of qualification programs for NRC technical staff, the TTC also provided Reactor Concepts Courses in support of the orientation program managed by the Office of Personnel, reactor technology courses in support of the PRA Technology Transfer Program, also managed by the Office of Personnel, and National News Media Seminars in support of the public affairs function of the Office of Governmental and Public Affairs.

The TTC staff was also able to accommodate a number of requests for special courses during the year. Non-scheduled courses were completed to meet a variety of special reactor technology needs. Special simulator courses were conducted on the Browns Ferry Nuclear Plant simulator for Office of Special Projects personnel and on the in-house GE simulator for personnel of the Mexican regulatory agency. Special EOP simulator courses were presented in GE and Westinghouse technology for RES personnel with severe accident management responsibilities. Special reactor technology course was presented in GE and Westinghouse technology for State of Illinois personnel. A special two-week reactor technology course was presented in headquarters in GE and Westinghouse technology in order to maximize attendance by the NRR staff.

Non-scheduled courses were also completed to meet a variety of special needs in the specialized technical training area. Accident/ Incident Investigation Workshops (G-202) were given on 7 different occasions in headquarters and regional offices. Special courses were arranged for the NRR staff on Replacement of Nuclear Parts and Electrical Distribution System Functional Inspection (EDSFI) training. Special Site Access Training was provided for NRR Canadian contractors. A special QA Auditor Course was arranged for NMSS personnel.

Qualification Program Development

A phased plan for development of qualification and technical training requirements for headquarters personnel began in FY 1988 and continued through FY 1989 and FY 1990. This plan included grouping of positions with similar job tasks, identification of draft training requirements, integration and reconciliation of the individual training needs, and formalization of training requirements by the Program Offices. Development of prioritized training defined by the Program Offices began in FY 1988 and continued during FY 1990 to the point that all training identified as high or medium priority by NRR, NMSS, and AEOD is now available for staff attendance. Many of the products of these efforts are described elsewhere in this report.

During the year there were two meetings of the Training Advisory Group (TAG) to collect management feedback on technical training programs and various ongoing or planned initiatives. One major TAG initiative was the establishment of an NRC Inspection Manual Chapter (IMC) 1245 Work Group. This group met several times during the year to review the manual chapter specifying the training requirements for NRC inspectors and recommend necessary changes. Major tasks undertaken by this group include detailed reviews of existing training requirements against the inspection procedures in NRC Inspection Manual Chapter 2515, special training which might be required by unique inspection procedures, administrative-type training not covered by formal courses, and generic qualification journals for the various regional inspector positions. As new

qualification journals are developed for certain headquarters positions, these too will be reviewed by the work group.

Two of the outcomes from the work group effort have substantial impact on TTC resources. The first is the change to IMC 1245 making completion of the reactor technology full course series required for essentially all NRC personnel associated with reactor operations inspections. The second is the change making the emergency operating procedure (EOP) simulator course part of the full course series as initial required training. The cumulative effect of these changes is that a reactor technology full course series now will require 13 course-weeks to accomplish (rather than 8 course-weeks) and students will spend one extra week of training to complete the series.

Risk-Based Training Culture

A major initiative during the last year was associated with expanding risk-based perspectives into TTC programs. The goal was to bring a risk-based culture to TTC courses, in addition to the existing operationally oriented culture. Projected results would be increased staff awareness of major risk contributors and risk-dominant sequences and upgrade of TTC course manuals and course materials to reflect the cultural change. TTC staff members received special training in Fundamentals of PRA, PRA Applications and Lessons Learned, and PRA Basics for Inspection Applications Courses. As part of the second course, the NRR and AEOD office directors and RES deputy office director visited the TTC facility and gave senior management perspectives on risk to the TTC staff. A generic module to be used in reactor technology courses of all vendor designs was jointly developed with the PRA contractor. Arrangements for the special PRA training for the TTC staff and technical assistance by the PRA contractor were made by the Office of Personnel.

The TTC staff has essentially implemented the risk-based training development plan. The effort to add the appropriate PRA and severe accident perspectives into each of the reactor technology full course series has been completed for the CE and B&W series and is nearly complete for the GE and Westinghouse series. All full series courses beginning after January 1, 1991 will take advantage of this considerable development effort and change in perspective.

Reactor Technology Development

In addition to incorporating risk-based material into TTC courses and performing normal course maintenance throughout the year, a number of other curriculum development activities were completed. A major overhaul of the B&W Technology Course (R-306P) manual to reflect B&W simulator systems was completed. B&W simulator procedures were revised to agree with the B&W Owners Group Technical Basis Document. Westinghouse simulator off-normal procedures, surveillance test procedures, and general operating procedures were developed. Significant development was accomplished during the year for the courses associated with the GE full course series. Course manuals and instructor guides have been revised to add new coverage of air system problems, service water system problems, and interfacing system LOCAs. Much effort has been devoted to development and revision of emergency operating procedure flowcharts for use in simulator courses.

Considerable effort was devoted during the year in the implementation of the examination banks for all reactor technology areas, including a review of all questions, and relating each question to course module learning objectives. Two years ago the TTC obtained a Computerized Exam Bank System (CEBS) which has been upgraded and is now in full implementation. The size of the various examination

banks was increased significantly during the year, and CEBS use by the TTC staff is an important tool for achieving consistency and efficiency.

Specialized Technical Training Development

A number of commercial contracts, interagency agreements, task order contracts, and small purchase procurements were used to develop and deliver specialized technical training to meet Agency needs. During the year, 7 task orders were issued for the specialized technical training task order contract and 3 were issued for the radiation protection task order contract. This allowed the TTC to satisfy a number of previously unplanned, reactive training needs identified by regions and program offices as high priority initiatives.

Significant progress was made in the implementation of the health physics training curriculum. A number of new courses in the HP area were developed and presented during the year. These included the Health Physics Technology Course (H-201), Pool Type Irradiator Course (H-315), and Whole Body Counting/Internal Dosimetry Course (H-312). Enrollment in certain TTC courses was opened to State personnel and, likewise, enrollment in certain GPA courses was opened to NRC personnel. All courses required for initial qualification of reactor and nuclear materials health physicists are now available for attendance.

Hardware Training Aids

The TTC actively acquired and configured hardware components for use as training aids during the year. This project has involved the location, acquisition, modification, mounting, and labeling of the equipment and incorporation of the new training aids into courses. Open purchase orders with local companies were established to allow acquisition and configuration of equipment. A wide variety of components were added to the TTC training aid inventory during the year including the following: centrifugal and positive displacement pumps, pump motors, numerous small valves of different types, heat exchangers, valve air operators and motorized operators, and a small boiler feedwater pump turbine with governor and trip valves. These training aids will be of particular importance for training of new NRC employees who do have little or no power plant experience.

Simulator Management

Long term, cost-effective solutions have been implemented for NRC reactor simulator usage for the GE, Westinghouse, and B&W reactor vendor designs. The amount of simulator time required to meet NRC needs is approximately 1,500 hours each for the GE and Westinghouse vendor designs and 600 hours each for the B&W and CE vendor designs.

CE simulator time was previously made available through a contract with the vendor. In FY 1989 a needs analysis was conducted and the potential availability of CE simulator time at a licensee facility and the potential availability of a CE simulator were researched. A procurement effort to obtain a full scope reactor simulator modeling the CE design began in 12/89 in order to provide a long-term, stable solution for CE simulator training. During FY 1990, the existing contract providing CE simulator time was extended until 6/30/90 to cover simulator training scheduled for FY 1990. Until the CE simulator procurement has been completed (currently projected for 1/91), there is no mechanism in place to provide CE simulator training which will result in deferral of CE simulator courses scheduled for the first part of FY 1991. The successful bidder for the CE simulator procurement will be required to provide the NRC with interim simulator time at some CE simulator facility while modifications are being made to the simulator to be ultimately delivered to the TTC.

The three NRC controlled simulators have modeling which is typical of early generation simulators with two phase flow capabilities. NRC usage of simulator time typically involves extended scenarios. Additionally, exercise of emergency operating procedures (EOPs) and some human factors research projects are limited by existing simulator modeling. A comprehensive plan to upgrade the capabilities of these simulators has been developed and is being implemented. The upgrade process involves simulator computer replacement, simulator instructor station replacement, addition of input/output override capability to the simulators, high fidelity thermal hydraulic code procurement and conversion, and high fidelity code addition and integration with other simulator models.

Under the plan, significant improvements have been made to the NRC controlled simulators. Refurbished super-mini computers were obtained and are now part of the permanent configuration for the GE and B&W simulators. The Westinghouse simulator sill be similarly configuraed during FY 1991. These computers were required in order to establish a hardware configuration capable of supporting an advanced thermal hydraulic simulation code.

New instructor stations were designed, developed, and implemented on the GE and B&W simulators by the TTC simulator engineering staff in order to support the configuration change involving the replacement simulator computers. These instructor stations were implemented on Apple Macintosh computers and offer considerably enhanced capabilities. Input/output (I/O) override capability, which allows TTC instructors to override switches, recorders, meters, and controllers independent of simulation parameter values, has been established for the B&W and GE simulators. As a result, a wide variety of increasingly complex simulator scenarios can be incorporated in future reactor simulator training. The B&W and GE simulators are now essentially ready for the addition of a high fidelity thermal hydraulic code. The addition of such a code is a very complex process which is projected to span several months for each simulator. The procurement effort to obtain a high fidelity thermal hydraulic code was in progress for the entire duration of the fiscal year.

In addition to the upgrade efforts, a number of other simulator enhancements have been accomplished. Development of response procedures for the various annunciator windows associated with the GE simulator is 95% complete. Off-normal and surveillance test procedures were developed for the Westinghouse simulator. The technical specifications used with the B&W simulator were converted to standard technical specifications. The number of available initial conditions for the B&W simulator was increased from the 30 which were available when the simulator was delivered to 72. A number of malfunctions were added or modified for use in B&W simulator courses to provide improvements in B&W EOP simulator training.

Simulator engineering work was done at the TTC in support of the Emergency Response Data System (ERDS). A mechanism was developed to link simulation computers to ERDS. Simulator modeling changes, data point identification, and data formatting have been completed to make the GE simulator available for ERDS testing as a data feeder. All simulators located at the TTC will ultimately be able to serve as feeders for ERDS.

TTC Staff Technical Support

TTC staff members provided technical support in a number of areas throughout the year. Former students continued to frequently ask TTC staff members for technical opinions on a variety of issues. Additionally, the TTC staff supported a Diagnostic Evaluation Team and several drills as a member of the headquarters Reactor Safety Team.

Support was provided in the development and beta testing of the Light Water Reactor Plant Analyzer. Considerable effort was devoted to playing the role of reactor operators and senior reactor operators while being evaluated by operator license examiners. This is the most manpower intensive activity that the TTC does in that it requires the effort of half of the TTC instructor staff each time it is done. Additional support was provided on several occasions for Inspection Procedures Courses provided by the Office of Governmental and Public Affairs primarily for agreement state personnel.

The TTC hosted a meeting of the US-USSR Joint Coordinating Committee for Civilian Nuclear Reactor Safety (JCCCNRS) Working Group 9. This working group is associated with diagnostics, analysis equipment, and systems for supporting nuclear plant operators. Presentations were given on the organization and staffing of nuclear power plants in the US and USSR, training and certification of Soviet nuclear plant staff, Soviet diagnostic systems, technical components of US emergency operating procedures, US experience in Safety Parameter Display Systems (SPDS), a typical emergency operating procedure training scenario, procedure violations at US nuclear plants, US lessons learned from EOP inspections, and an expert monitor system. The working group meeting took advantage of the facilities at the TTC. NRC emergency operating procedure simulator training was observed by the Soviet working group members. SPDS displays were observed by and explained to working group participants on the GE, Westinghouse, and B&W simulators. Industry expert system demonstrations, arranged through Electric Power Research Institute, were provided on the Emergency Operating Procedures Tracking System (EOPTS) and the Reactor Emergency Action Level Monitor (REALM) System. In addition to support by NRR and RES, several TTC staff members were heavily involved with the meeting.

Other Items of Interest

The TTC local area network (LAN) went into full operation during the year. This LAN was designed, developed, and implemented by the TTC staff in order to link simulator engineer workstations, simulation computers, simulator instructor stations, special purpose workstations, and individual user workstations. The ethernet LAN supports connectivity of MS DOS based microcomputers, Apple Macintosh microcomputers, and Encore super-mini computers. A number of applications are now available on the LAN in both MS DOS and Apple Macintosh formats. During the year, the TTC staff completed a lengthy evaluation of desktop publishing and graphics workstations. After a side by side comparison of testing under normal work activities for a period of time spanning several months, Apple Macintosh microcomputers were established as the graphics stations of choice for the TTC because of the clear gains in staff productivity. All TTC graphics and desktop publishing activities are done in house with high technology equipment.

The TTC staff began desktop publishing of course manuals during the year. Course manuals for the B&W Technology Course (R-306P), Westinghouse Technology Course (R-104P), and Westinghouse Technical Managers Course (R-904P) have been completed. The Westinghouse Technology Course (R-304P) manual is 90% complete. The GE Technology Course (R-106B) and GE Technology Course (R-306B) manuals are 95% and 80% complete respectively. The Site Access Training (H-100) manual is 90% complete. Desktop publishing of these manuals makes them easier for students to read and reduces the volume of text by about 33%.

Efforts are underway to obtain additional space that will be used for additional classrooms and for storage. Additional classrooms are needed to

support larger class sizes in reactor technology courses, additional specialized technical training courses, and courses associated with NRC technical intern programs. Part of the additional space is needed for storage of course materials and simulator computer equipment which has been taken out of service.

Table 1 – Reactor Technology Totals By Course Group

Course	QTY	C-W	R1	R2	R3	R4	R5	NRR	AEOD	NMSS	CTR	IP	SP	RES	OTH	TOT
Reactor Concepts	6	6	28	0	0	0	0	24	2	11	0	0	0	1	45	111
Technology (100 Level)	9	9	10	10	21	1	8	49	2	4	3	0	40	7	8	163
Technology (200 Level)	3	6	0	0	0	0	0	40	0	0	1	0	1	0	1	43
Technology (300 Level)	6	18	27	7	19	6	6	20	3	0	3	5	2	0	1	99
Technology for Cross Training	2	6	2	2	3	3	1	2	2	0	4	0	0	0	0	19
Advanced Technology (500 Level)	6	12	24	9	19	5	6	20	3	0	2	5	2	0	1	96
Simulator (Other)	3	3	0	0	0	0	0	15	0	0	0	0	0	0	0	15
Simulator (Series)	21	21	27	12	21	6	6	19	6	0	9	4	2	0	1	113
Simulator (RTO)	8	8	0	0	0	0	0	38	1	0	2	0	1	0	0	42
Simulator (EOP)	27	27	16	30	17	15	8	12	2	0	20	6	0	10	0	136
Simulator (Refresher for Examiners)	2	2	4	1	0	0	0	1	0	0	4	0	0	0	0	10
GE Nuclear Engineering	1	2	2	3	2	1	1	1	2	0	0	0	0	0	0	12
GE Maintenance Training Overview	2	2	1	2	2	1	1	5	0	0	0	0	0	0	0	12
Technical Managers	3	3	0	3	6	4	0	3	0	0	0	0	0	0	0	16
Severe Accident Overview Seminar	4	4	30	0	30	0	27	10	12	0	0	0	0	0	0	109
Totals:	103	129	171	79	140	42	64	259	35	15	48	20	48	18	57	996

Key (Applicable for Tables 1 - 4)

QTY	=	Quantity of Courses
C-W	=	Course-Weeks
R1	=	Region I Personnel
R2	=	Region II Personnel
R3	=	Region III Personnel
R4	=	Region IV Personnel
R5	=	Region V Personnel
NRR	=	Office of Nuclear Reactor Regulation Personnel
AEOD	=	Office for Analysis and Evaluation of Operational Data Personnel
NMSS	=	Office of Nuclear Material Safety and Safeguards Personnel
CTR	=	NRC Contractors
IP	=	International Programs Personnel (Foreign Nationals)
SP	=	State Programs Personnel
RES	=	Office of Nuclear Regulatory Research Personnel
OTH	=	Personnel from Other NRC Offices
TOT	=	Total

Table 2 – Reactor Technology Totals By Course

Course	CODE	QTY	C-W	R1	R2	R3	R4	R5	NRR	AEOD	NMSS	CTR	IP	SP	RES	OTH	TOT
General Electric Technology																	
GE Technology	R-101B	2	2	1	0	0	0	0	11	0	0	0	0	19	4	0	35
GE Technology	R-106B	2	2	3	6	9	0	3	8	0	0	0	0	0	0	2	31
GE Technology	R-206B	1	2	0	0	0	0	0	14	0	0	0	0	0	0	0	14
GE Technology	R-306B	3	9	16	3	9	2	0	5	1	0	0	1	2	0	1	40
GE Advanced Technology	R-506B	3	6	15	5	9	2	0	5	1	0	0	1	2	0	1	41
GE Simulator	R-605B	1	1	0	0	0	0	0	5	0	0	0	0	0	0	0	5
GE Simulator	R-606B	7	7	14	4	11	1	0	4	1	0	0	1	2	0	1	39
GE RTO Simulator	R-611B	2	2	0	0	0	0	0	13	0	0	0	0	0	0	0	13
GE EOP Simulator	R-621B	9	9	7	5	8	3	1	3	1	0	5	6	0	5	0	44
GE Sim. Refresher for Examiners	R-701B	1	1	3	1	0	0	0	0	0	0	0	0	0	0	0	4
GE Simulator Refresher	R-706B	1	1	0	0	0	0	0	6	0	0	0	0	0	0	0	6
GE Nuclear Engineering	R-801B	1	2	2	3	2	1	1	1	2	0	0	0	0	0	0	12
GE Maintenance Training Overview	R-802B	2	2	1	2	2	1	1	5	0	0	0	0	0	0	0	12
GE Technical Managers	R-906B	2	2	0	3	4	2	0	3	0	0	0	0	0	0	0	12
GE Subtotal:		37	48	62	32	54	12	6	83	6	0	5	9	25	9	5	308
Westinghouse Technology																	
Westinghouse Technology	R-101P	3	3	0	0	2	0	1	23	2	3	1	0	20	3	6	61
Westinghouse Technology	R-104P	2	2	6	4	10	1	4	7	0	1	2	0	1	0	0	36
Westinghouse Technology	R-204P	2	4	0	0	0	0	0	26	0	0	1	0	1	0	1	29
Westinghouse Technology	R-304P	3	9	11	4	10	4	6	15	2	0	3	4	0	0	0	59
Westinghouse Advanced Technology	R-504P	3	6	9	4	10	3	6	15	2	0	2	4	0	0	0	55
Westinghouse Simulator	R-603P	1	1	0	0	0	0	0	4	0	0	0	0	0	0	0	4
Westinghouse Simulator	R-604P	9	9	8	4	8	3	5	13	2	0	2	3	0	0	0	48
Westinghouse RTO Simulator	R-611P	6	6	0	0	0	0	0	25	1	0	2	0	1	0	0	29
Westinghouse EOP Simulator	R-621P	12	12	5	20	6	10	4	4	1	0	7	0	0	5	0	62
Westinghouse Sim. Ref. for Examiners	R-701P	1	1	1	0	0	0	0	1	0	0	4	0	0	0	0	6
Westinghouse Technical Managers	R-904P	1	1	0	0	2	2	0	0	0	0	0	0	0	0	0	4
Severe Accident Overview Seminar	R-911P	4	4	30	0	30	0	27	10	12	0	0	0	0	0	0	109
Westinghouse Subtotal:		47	58	70	36	78	23	53	143	22	4	24	11	23	8	7	502
Combustion Engineering Technology																	
CE Technology for Cross Training	R-325P	2	6	2	2	3	3	1	2	2	0	4	0	0	0	0	19
CE Simulator	R-605P	2	2	2	2	1	1	1	0	2	0	4	0	0	0	0	13
CE EOP Simulator	R-622P	3	3	1	1	1	2	3	5	0	0	5	0	0	0	0	18
Combustion Engineering Subtotal:		7	11	5	5	5	6	5	7	4	0	13	0	0	0	0	50
Babcock & Wilcox Technology																	
B&W Simulator	R-606P	3	3	3	2	1	1	0	2	1	0	3	0	0	0	0	13
B&W EOP Simulator	R-623P	3	3	3	4	2	0	0	0	0	0	3	0	0	0	0	12
Babcock & Wilcox Subtotal:		6	6	6	6	3	1	0	2	1	0	6	0	0	0	0	25
Generic Reactor Technology Training																	
Reactor Concepts	R-100	6	6	28	0	0	0	0	24	2	11	0	0	0	1	45	111
Generic Subtotal:		6	6	28	0	0	0	0	24	2	11	0	0	0	1	45	111
Reactor Technology Totals:		103	129	171	79	140	42	64	259	35	15	48	20	48	18	57	996

Table 3 -- Specialized Technical Training By Enrollment Type

Course	QTY	C-W	R1	R2	R3	R4	R5	NRR	AEOD	NMSS	CTR	IP	SP	RES	OTH	TOT
Customized Training																
Power Plant Engineering	2	4	11	0	1	1	0	20	0	0	0	0	0	0	0	33
Motorized Valve Actuators	1	1	1	3	3	2	1	2	0	0	0	0	0	0	0	12
Welding Technology and Codes	1	2	1	0	5	0	0	2	0	0	0	0	0	0	0	8
..UE Technology and Codes	1	2	1	0	1	0	1	6	0	0	0	0	0	1	0	10
Eddy Current Testing	1	1	3	0	2	0	0	2	1	0	0	0	0	0	0	8
EDSFI Training	1	1	5	5	5	4	4	6	0	0	0	0	0	0	1	30
Site Access Training	4	4	0	0	0	0	0	37	6	4	2	14	0	4	0	67
Site Access Refresher Training	9	9	0	0	0	0	0	133	28	1	1	0	0	0	2	165
OSHA Orientation	2	2	13	5	15	1	0	0	0	9	0	0	0	0	1	44
Health Physics Technology	1	2	1	6	5	1	3	0	0	0	0	0	2	0	1	19
Diag. & Therapeutic Nuclear Medicine	1	1	6	0	3	0	0	0	0	0	0	0	4	0	0	13
Safety Aspects of Industrial Rad.	2	2	3	3	2	1	0	0	0	0	0	0	27	0	0	36
Transportation of Rad. Materials	1	1	4	0	4	5	2	0	0	2	0	0	1	0	1	19
Environmental Sampling & Analysis	1	1	3	5		4	0	0	1	3	0	0	0	0	0	17
Int. Dosimetry/Whole Body Counting	1	1	1	4	5	1	2	0	0	0	0	0	2	0	0	15
Teletherapy & Brachytherapy	1	1	6	4	5	2	0	0	0	1	0	0	0	0	1	19
Safety Aspects of Well Logging	1	1	0	0	0	2	0	0	0	0	0	0	23	0	1	26
Pool Type Irradiator Technology	1	1	3	5	5	0	0	0	0	2	0	0	0	0	0	15
Fundamentals of Inspection	4	4	38	4	21	18	9	8	0	0	0	3	5	0	0	106
Written Examination Techniques	2	2	1	1	1	2	0	2	0	0	3	0	0	0	0	10
Nonpower Reactor Technology	1	1	5	2	6	2	2	2	0	0	1	0	0	0	1	21
Operating Examination Techniques	4	8	9	4	7	1	0	4	0	0	5	0	0	0	1	31
MORT A/I Investigation Workshop	3	5	14	0	18	0	0	5	20	0	0	0	2	0	0	59
Inspecting for Performance	7	7	15	13	46	2	24	27	2	0	0	0	4	6	2	141
PRA Basics for Insp. Applications	2	2	0	0	0	16	0	0	15	0	0	0	0	0	0	31
IIT Refresher	1	1	1	2	1	1	1	6	5	0	0	0	0	1	0	18
Procurement & Repl. of Nuc. Parts	1	1	3	2	2	2	1	14	1	0	0	0	0	0	1	26
A/I Investigation Workshop	1	1	0	0	1	20	0	0	0	0	0	0	0	0	0	21
Root Cause Seminar	1	1	0	0	78	0	0	0	0	0	0	0	0	0	0	78
Customized Training Subtotals:	59	70	148	68	243	88	50	276	79	22	12	17	70	12	13	1098
Open Enrollment Training																
Applied Health Physics	2	10	1	3	5	0	0	0	0	0	0	0	0	0	1	10
Rad. Emergency Preparedness	2	2	0	0	1	0	0	1	0	0	0	1	0	0	0	3
Radiological Accident Assessment	2	2	1	0	1	0	1	3	0	0	0	0	0	1	0	7
Radiological Emergency Response	1	2	0	0	0	1	0	0	0	0	0	0	0	0	0	1
Respiratory Protection	2	2	2	1	2	3	0	1	0	1	0	0	0	0	0	10
Safety Officer's Practical Training	2	2	0	1	1	0	0	0	0	1	0	0	0	0	0	3
Special Response Team Training III	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1
MORT A/I Investigation Workshop	4	8	0	1	3	1	1	2	0	0	0	0	1	0	0	9
MORT Seminar	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1
Open Enrollment Training Subtotals:	17	30	4	6	13	5	2	9	0	2	0	1	1	1	1	45
Specialized Technical Training Total:	76	100	152	74	256	93	52	285	79	24	12	18	71	13	14	1143

Table 4 – Specialized Technical Training Totals By Course

Course	CODE	QTY	C-W	R1	R2	R3	R4	R5	NRR	AEOD	NMSS	CTR	IP	SP	RES	OTH	TOT
Engineering Support																	
Power Plant Engineering	E-110	2	4	11	0	1	1	0	20	0	0	0	0	0	0	0	33
Motorized Valve Actuators	E-112	1	1	1	3	3	2	1	2	0	0	0	0	0	0	0	12
Welding Technology and Codes	E-303	1	2	1	0	5	0	0	2	0	0	0	0	0	0	0	8
NDE Technology and Codes	E-306	1	2	1	0	1	0	1	6	0	0	0	0	0	1	0	10
Eddy Current Testing	E-307	1	1	3	0	2	0	0	2	1	0	0	0	0	0	0	8
EDSFI Training	None	1	1	5	5	5	4	4	6	0	0	0	0	0	0	1	30
Engineering Support Subtotal:		**7**	**11**	**22**	**8**	**17**	**7**	**6**	**38**	**1**	**0**	**0**	**0**	**0**	**1**	**1**	**101**
Health Physics																	
Site Access Training	H-100	4	4	0	0	0	0	0	37	6	4	2	14	0	4	0	67
Site Access Refresher Training	H-101	9	9	0	0	0	0	0	133	28	1	1	0	0	0	2	165
OSHA Orientation	H-107	2	2	13	5	15	1	0	0	0	9	0	0	0	0	1	44
Applied Health Physics	H-109	2	10	1	3	5	0	0	0	0	0	0	0	0	0	1	10
Health Physics Technology	H-201	1	2	1	6	5	1	3	0	0	0	0	0	2	0	1	19
Radiological Emergency Response	H-303	1	2	0	0	0	1	0	0	0	0	0	0	0	0	0	1
Diag. & Therapeutic Nuclear Medicine	H-304	1	1	6	0	3	0	0	0	0	0	0	0	4	0	0	13
Safety Aspects of Industrial Rad.	H-305	2	2	3	1	2		0	0	0	0	0	0	27	0	0	36
Rad. Emergency Preparedness	H-306	2	2	0			0	0	1	0	0	0	1	0	0	0	3
Radiological Accident Assessment	H-307	2	2	1	0	1	0	1	3	0	0	0	0	0	1	0	7
Transportation of Rad. Materials	H-308	1	1	4	0	4	5	2	0	0	2	0	0	1	0	1	19
Environmental Sampling & Analysis	H-310	1	1	3	5	1	4	0	0	1	3	0	0	0	0	0	17
Respiratory Protection	H-311	2	2	2	1	2	3	0	1	0	1	0	0	0	0	0	10
...rt. Dosimetry/Whole Body Counting	H-312	1	1	1	4	5	1	2	0	0	0	0	0	2	0	0	15
...eletherapy & Brachytherapy	H-313	1	1	6	4	5	2	0	0	0	1	0	0	0	0	1	19
Safety Aspects of Well Logging	H-314	1	1	0	0	0	2	0	0	0	0	0	0	23	0	1	26
Pool Type Irradiator Technology	H-315	1	1	3	5	5	0	0	0	0	2	0	0	0	0	0	15
Health Physics Subtotal:		**34**	**44**	**44**	**36**	**54**	**21**	**8**	**175**	**35**	**23**	**3**	**15**	**59**	**5**	**8**	**486**
Safeguards																	
Safety Officer's Practical Training	S-105	2	2	0	1	1	0	0	0	0	1	0	0	0	0	0	3
Special Response Team Training III	None	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1
Safeguards Subtotal:		**3**	**3**	**0**	**1**	**1**	**0**	**0**	**1**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**4**
Inspection or Examination Techniques																	
Fundamentals of Inspection	G-101	4	4	38	4	21	18	9	8	0	0	0	3	5	0	0	106
Written Examination Techniques	G-103	2	2	1	1	1	2	0	2	0	0	3	0	0	0	0	10
Nonpower Reactor Technology	G-106	1	1	5	2	6	2	2	2	0	0	1	0	0	0	1	21
Operating Examination Techniques	G-107	4	8	8	4	7	1	0	4	0	0	5	0	0	0	1	31
MORT A/I Investigation Workshop	G-200	3	5	14	0	18	0	0	5	20	0	0	0	2	0	0	59
MORT A/I Investigation Workshop	G-200	4	8	0	1	3	1	1	2	0	0	0	0	1	0	0	9
MORT Seminar	G-201	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1
Inspecting for Performance	G-303	7	7	15	13	46	2	24	27	2	0	0	0	4	6	2	141
PRA Basics for Insp. Applications	G-500	2	2	0	0	0	16	0	0	15	0	0	0	0	0	0	31
IIT Refresher	G-601	1	1	1	2	1	1	1	6	5	0	0	0	0	1	0	8
Procurement & Repl. of Nuc. Parts	None	1	1	3	2	2	2	1	14	1	0	0	0	0	1	0	26
A/I Investigation Workshop	None	1	1	0	0	1	20	0	0	0	0	0	0	0	0	0	21
...ot Cause Seminar	None	1	1	0	0	78	0	0	0	0	0	0	0	0	0	0	78
...nsp. or Exam. Techniques Subtotal:		**32**	**42**	**86**	**29**	**184**	**65**	**38**	**71**	**43**	**0**	**9**	**3**	**12**	**7**	**5**	**552**
Specialized Technical Training Totals:		**76**	**100**	**152**	**74**	**256**	**93**	**52**	**285**	**79**	**24**	**12**	**18**	**71**	**13**	**14**	**1143**