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NUCLEAR REGULATORY COMMISSION

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34TH REGULATORY INFORMATION CONFERENCE (RIC)

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TECHNICAL SESSION - TH24

HEALTH PHYSICISTS UNITE: BUILDING CAPACITY FOR OUR

RADIATION PROTECTION FUTURE

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THURSDAY,

MARCH 10, 2022

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The Technical Session met via Video-  
Teleconference, at 8:30 a.m. EST, Theresa Clark,  
Deputy Director, Division of Materials Safety,  
Security, State and Tribal Programs, Office of  
Nuclear Material Safety and Safeguards, Nuclear  
Regulatory Commission, presiding.

PRESENT:

THERESA CLARK, Deputy Director, Division of  
Materials Safety, Security, State and Tribal  
Programs, NMSS/NRC

KATIE TAPP, Health Physicist, Medical Safety &  
Events Assessment Branch, Division of  
Materials Safety, Security, State and Tribal  
Programs, NMSS/NRC

ANGELA LEEK, Bureau Chief, Radiological Health and  
Conference of Radiation Control Program  
Directors Chairperson, Iowa Department of  
Public Health and CRCPD

KATHRYN HELD, President, National Council on  
Radiation Protection and Measurements

THOMAS JOHNSON, Professor, Colorado State University

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## P R O C E E D I N G S

(8:30 a.m.)

MS. CLARK: Welcome. Good morning, good afternoon, good evening, wherever you're watching this broadcast from. It could be anywhere, because this is a real worldwide topic that we're going to be talking about today when we talk about the future of our radiation protection programs across the world and how we build capacity within that field.

I'm Theresa Clark. I'm one of the senior leaders who's responsible for the Nuclear Materials Users Program here at the Nuclear Regulatory Commission. We oversee the safe and secure use of radioactive materials for various uses like industrial, academic research and medical uses.

We always hear that people are our most precious resource, and we totally agree with that. When it comes to radiation protection, making sure that we have health physicists and related radiation protection professionals is truly essential to meet our mission.

We're looking forward to having an open and wide-ranging discussion on this topic to figure out best how to inspire students to join this field,

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how to attract them to opportunities at state and federal agencies and how to keep them once they're here and trained.

Before I get into the details of today's session, I want to take a moment to extend special thanks to Daniel DiMarco and to Dan Strohmeier who worked together to ensure that we had all of the logistics arranged for this session.

Daniel in particular dealt with all the checklists and the documents and the forms that had to be submitted often on tight deadlines with grace and with a positive attitude. And Dan backed up Daniel every step of the way to help out to get us ready for today. Thanks so much. We couldn't have done it without you.

Slide 2, please. For this session, we'll have four speakers with a variety of backgrounds and responsibilities give us their initial thoughts on this topic. I'll introduce each speaker in full before they give their presentation, but you can see the names on this slide and get excited. We got some real giants in our field today.

After the presentations are over, then you'll have a chance to join the conversation and ask

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questions to shape the remainder of the discussion. Please use the Q&A box to send in your questions throughout the session. We've got a few planned, of course, but we love to answer the questions that are of most interest to you.

During the presentations, after each speaker, you'll also be prompted to answer some live polling questions. I want to thank our health physics community here at the NRC for teaming up to develop these questions. The answers that you give will help shape our conversation, and it'll also give us some good data to help us decide what future activities to take.

Slide 3, please. While I have the floor, I am not going to miss the opportunity to highlight a few places where the NRC is actively hiring. There are two resume bank-type postings open for the next several months that we're going to use to fill various openings as they come up. One's more focused on headquarters, at Grades 11 through 15, and one is designed for regional license reviewers and inspectors at Grades 11 through 13. If you qualify for these, please use the QR codes to find them on USA Jobs and put your information in.

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Just for your awareness: for a Grade 11 job, applicants usually need a bachelor's or master's with a couple years of experience, or a Ph.D. without additional experience. And the requirements go up from there to 15, which is our highest level general staff job. That's what you'll see third on the slide, which is a public posting for a senior intergovernmental liaison PM, and that's in a branch that nurtures our Agreement State relationships. That one closes next week.

With that, I'll introduce our first presenter, Dr. Katie Tapp, who's a medical physicist in my division. Katie joined the NRC in 2006 and currently focuses on radiation safety for emerging medical technologies and release of patients containing byproduct material.

She's also worked in other offices at the NRC, the Office of Nuclear Regulatory Research and the Office of New Reactors, and as an inspector in Region III near Chicago. Katie received her doctorate in medical physics from Purdue University and her bachelor's in nuclear engineering from University of Illinois.

Katie will talk about what we're doing

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inside the agency to recruit, train and retain health physicists. Let's go to Katie's presentation's please. Take it away, Katie.

MS. TAPP: Thank you, Theresa. As Theresa mentioned, I'm Katie Tapp, and I'm a medical physicist that NRC currently. I'm going to talk today about how the NRC is building our health physics capacity for our future in radiation protection.

Slide 2, please. The need for health physicist and radiation protection experts is growing. We are constantly being asked new and emerging radiation protection questions as well as we're constantly evaluating things that we've done in the past with updated information and modern scientific approaches. Unfortunately, it appears the health physics capacity will shrink unless we act to promote and keep health physicists in the field.

In recent years, we have seen a huge wave of staff retirements, taking with them years and years of knowledge and skills. Due to the age of the field, retirements were predicted, but it still hurts to see our friends and their knowledge go. In addition, many health physicists have left the field recently going on to different positions elsewhere.

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So we need to build our capacity by hiring and training new staff. It takes time to train someone well. And at the NRC, we are finding fewer available candidates in health and medical physics fields, especially those who are fully trained already or ready to take on immediate responsibilities. To keep our capacity strong, we also need to retain and engage the staff we have. At the NRC, we are trying to develop a lively and supportive health physics community to support retention.

Slide 3, please. The NRC is partnering to grow our health physics skills and expertise by maintaining a pipeline to bring in more skilled individuals, supporting development to grow those skills, and creating a community for all health physicists to share and connect. I'll discuss each of these areas a little further.

Slide 4, please. To increase the pipeline of health physicists across the nation, the NRC provides grants to train new radiation protection professionals. This grant program provides scholarships and fellowships for students in nuclear-related fields such as health physics. It also provides funding for faculty development.

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Those students who receive support must sign a service commitment to the industry. The NRC and Agreement State have recently hired individuals who have received these grants, including in areas of health physics.

The NRC has also increased our outreach and recruitment activities with University Champions. The Champions attend job fairs and other university events, get to know the staff, to share unique opportunities and jobs at the NRC.

Finally, the NRC has success in hiring in related fields such as physics or engineering to supplement traditionally trained health physicists. The NRC provides development opportunities for those in the related fields who wish to pursue health physics-related jobs.

Slide 5, please. Speaking of development, the NRC has numerous health physics classroom and laboratory courses. These courses are open to NRC and Agreement State Staff. The NRC has courses ranging from introduction to advanced health physics.

In addition, there are numerous courses in specific subject areas such as internal dosimetry, health physics statistics, medical use and byproduct

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material, environmental and air monitoring and many more.

The NRC has also increased the agility through cross training health physicists across the NRC such as material health physicists who can qualify as reactor health physicists and vice versa. The NRC also supports employee rotations to promote cross training and advancement.

Finally, the NRC supports numerous external opportunities such as conference attendances and private courses for career advancement.

Slide 6, please. Recently, the NRC has established an agency-wide community of health physicists. The goal of this community is to strengthen our health physics network across the agency, allowing us to get to know one another and learn what others' expertise and skills are and what they're passionate about.

The group establishes an internal website containing staff information and self-reported areas of expertise and areas which employees feel they can help others when needed. This page also contains a list of health physicists at the NRC who are willing to mentor others or have time to support projects

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specific to their skills.

The group holds a monthly community meeting. These meetings are informal and virtual, which have allowed staff at all levels of locations to participate equally. At the meetings, we discuss hot topics and then virtually go around the room to share interesting radiation protection projects we're all working on.

As someone who works in a very specific area at the NRC, I have learned a great deal about other interesting projects or issues ongoing throughout the NRC which I might have known about otherwise. These meetings give us a chance for the community to give advice to other members when they're working on a difficult question.

During these meetings, I have also found that some of my regulatory or technical questions specific to my area, which is medical, are actually very similar to others who are working in different areas. Even like reactors and medical, we are finding things that are in common, and this allows us to work together and collaborate.

Finally, this group has established an agency-wide certified health physics study group.

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The group meets routinely to keep each other on a study schedule and discuss problems so they are prepared to take the CHP exam this year. I wish them all luck.

Slide 7, please. Finally, we are working to increase our health physics capacity through external partnerships with others such as the International Atomic Energy Agency and the National Council of Radiation Protection and Measurements. Also, many staff in professional societies such as the Health Physics Society.

The NRC supports staff participating in conferences and on relevant committees, working groups and more when staff has interest and there is a safety need and the NRC need.

Finally, we are working with the Conference of Radiation Control Program Directors, or CRCPD, to design a framework for resource matching programs that would provide development rotations and/or allow qualified staff in one jurisdiction to temporary fill a need in another.

Through all these efforts, the NRC continues to build our health physicists capacity to support our needs.

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This is the end of my presentation, and I look forward to the panel discussion. Thank you.

MS. CLARK: Thanks so much, Katie. Although she was probably too modest to mention it, she's one of the real leaders behind that community program that you just heard about, along with Vince Holahan, John Towman (phonetic), and many others who make those meetings sparkle every month. So thank you, Katie.

Now, I'll be pulling up our first polling question before we get to our next speaker and hopefully you'll be able to see that shortly. We'd love to hear your thoughts on whether you had difficulty keeping your health physics capabilities, as Katie mentioned, during retirements or people shifting to other fields, getting promoted, et cetera. Feel free to give us your thoughts on that, and that will help shape the rest of the discussion.

(Pause.)

MS. CLARK: I think that that poll will be live on the side pane of where you're seeing this window for the next little while. We can see those answers as they start to fill in.

(Pause.)

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MS. CLARK: At least one person answered. Now, answers are coming in. Thanks, everyone.

So we're seeing definitely people are endorsing what Katie was saying about having struggles finding people, finding qualified candidates to hire. A couple of people are worried about the future but aren't quite there yet, and so hopefully some of what we're talking about today will help you at least get some ideas for how we can ease those worries. And hardly anyone is in Categories A and B, which is very interesting.

So keep clicking through those polls. I think that will be active for a little while longer until we put up the next poll question, and we'll use these answers as we shape the conversation.

I'll introduce our next speaker now. Our next speaker is Angela Leek. Angela is the radiation control program director for the Iowa State Program. She's also the chair of the Conference of Radiation Control Program Directors, or CRCPD which Katie mentioned a minute ago, and she's a certified health physicist.

Angela has a master's in radiation health physics from Oregon State, and she's working on a

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Ph.D. at Iowa State. Angela's going to talk about state perspectives on the health physics career field, and in particular what CRCPD has cooking. Let's swap to Angela's presentation, please.

Angela, the floor is yours.

MS. LEEK: Hi. Thank you so much, Theresa. We really appreciate the opportunity to participate today as has been mentioned. I think everyone is indicating on the poll, this is on the forefront of everyone's minds to ensure that we can continue our radiation protection activities that have been vital over the past decades as we move forward and everyone who has shaped where we're at today goes off to enjoy their well-deserved retirement.

So CRCPD, as Katie did a great job of setting up, is working closely with the NRC as well as many of other partners from the Health Physics Society and our other associations to try to see what we can do to work on this effort.

And we do appreciate all the work that NRC is doing that Katie outlined really nicely as far as adding HP as well as the states to the scholarship programs and also allowing for the training for our

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State staff as bring in Agreement State Staff. All the training that is provided by the NRC is vital to bringing those people up to speed and being ready to do our radiation protection activities.

Before I get started too much, I'm not sure if everyone is familiar with the CRCPD or what we do and how we coordinate across the states.

So the CRCPD is a non-profit organization, a 501(c)(3), and we are comprised of membership of many radiation professionals but really primarily focused on state and local government.

So our voting members are our radiation control program directors from each of our states. And each state, though, has their own jurisdiction as you probably are aware. We all have our own regulations, maintain our programs and regulations independently.

We overall have the same radiation protection goals similar in nature to all of our other federal agencies. However, we do individually in each of our states have focus areas based off of local environmental considerations, industries that we have common in our state, or political priorities within each of our states.

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That lets us have a diverse yet networked group of unique individuals and states that come together. And CRCPD's role is to try to bring us together under one hat and promote consistent radiation protection practices, provide leadership in radiation issues, especially as we have new and emerging issues, improve efficiency in providing radiation protection and enhance the relationship among all of our members from states to other associations that we're affiliated with.

Importantly here, all of the hiring, all of the responsibilities, all of the regulations stay within each of the states. The CRCPD doesn't provide funds, they don't provide staff. We provide suggested state regulations, but we don't mandate those. States don't necessarily have to use the regulations in the exact way they are.

So we're not exactly like the NRC is for the materials program where Agreement States do have to be compatible. Our suggested state regulations allow states to be a little more diverse. Our goal really is to bring the states together to find those commonalities. So what that does is puts us in a great position to bring all the states together to

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find solutions for issues just like what we're talking about today.

Next slide, please. Slide 2. As we've been discussing specifically with the NRC and also with many of our other partners in the HPS and other health physics-related entities, we are excited to see all the work and support and the efforts that are underway to help sustain and increase our workforces. We're very happy to have our federal partners and our other entities reaching out to offer assistance and ask for the States' input. We really look forward to how this is going to go forward.

As our part of this, we are seeing a lot of work being done to grow and sustain the existing workforce. Where we want to focus with CRCPD is looking to the priorities that we can affect most quickly, and that is filling the gaps that are going to be in place when we move our efforts forward.

We know that it's going to take time. Even if we have all of these efforts successfully bringing in new students and new graduates and new trainees and new staff on all of our staff, we have a lot of experience.

People that are retiring have had decades

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of experience and exposure to different types of radiation protection issues and the development of many of the things that we're leaning on today. It will take time for the new people to get up to speed to provide that same sort of expertise and oversight.

So we're trying to identify opportunities for mentoring and training staff across the states in conjunction with the NRC for sure and the National Materials Program. And as Katie mentioned, we want to try to figure out ways that we can most easily share for two ways.

For development of our staff, so if a state has expertise as I mentioned, they have a lot of expertise in something to do with radium because they have some legacy radium cleanup in their state, or they have a large medical facility that has a proton center or something very specialized, and another state loses that staff person and that expertise as they hire new people in, they can more easily send people to those facilities or to those states to get that experience to talk to an experienced person because it's very unlikely that any individual state will have or retain that expertise at the same time.

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So we want to clear the pathways for that. We want to make it easy. We want it to just be a phone call or a really quick setup to be able to network that.

In addition, if we do find ourselves in a position where we don't have enough staff or all of our staff are in a training mode, how can we actually use other states or the NRC staff to fill those qualified gaps while we bring our trainees up to speed because it can take a while for us to get our staff up to speed and fully qualified per our requirements.

In addition to that when we talk about this, many of you or many that are thinking of this think this happens already. And it does. We're really fortunate in our community to have a really strong network and to leverage across and everyone is open to sharing the resources and helping where we can.

But as time move forward, we're all going to get tighter and we're not going to be able to volunteer as much time. We may be strapped for resources. And we may have new radiation control program directors who don't know the network. They don't have those established relationships. So we

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need an easy way for them to be able to tap into which states have which expertise and how they can navigate that within their state's structure.

So can we do template agreements, can we allow kind of a reciprocity type of an consideration where we're not having to requalify someone if we want to use some other state staff. When you borrow that staff through this agreement, it comes with that. That qualification comes with that person.

Slide 3. As we're working on this and we, again, are just kicking off at the CRCPD with a new workforce development and coordination committee. I want to thank Joe, Nick, and Sarah (phonetic) from the NRC, and Sarah Sanderlin from New Jersey, who have been willing to co-chair this committee and get things kicking off on these efforts to find ways to streamline what I just described.

The working group is charged with the following items. We're going to try to develop that process for sharing experienced staff in that resource deficient environment. And again, that framework is that important piece that we're talking about here. It's not that we won't share already. We want to make it easier, we want to make it clearer.

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We also want to facilitate growth opportunities for health physics skills and identify educational opportunities for our radiological program staff. That includes tapping into our academia partners as well as the NRC and other training modules that might be available with our federal entities.

We also want to identify issues that might arise from credentialing or reciprocity and try again to, as I mentioned before, identify the mechanisms that will help us best share those resources and to reduce the amount of paperwork that might be needed to actually get that done.

And then we want to maintain awareness of where the resources are in the state, and that goes back to that network, that kind of catalogue for a lack of a better term, of what resources are available in each state, what expertise and what level of availability each state might have for capacity of training or sharing resources.

We will adjust and grow these charges and these topics as the committee figures out where we stand and where our niche can be on these short-term goals. We really are glad to be in partnership with

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the NRC with all of our other partners in the health, physics and radiation protection communities. We look forward to seeing strong effort and partnership as we go forward. Thank you.

MS. CLARK: Thank you so much for that overview, Angela. We're really grateful for your partnership with the NRC. And in particular, just offer -- I did an interagency rotation in 2019 and I found it really eye-opening and personally rewarding. And having these sorts of developmental rotations as well as meeting particular state needs is something that I'm personally very interested in. I look forward to hearing more about that as that team develops.

We're going to throw up our second poll now. This polling question is focused really on retention. I think everybody's mentioned retention as an essential component. We can't just be hiring new people every year. We need to make the ones that we have happy.

So we'd be curious to see what you have to say about what the most important factors either for you or for your staff regarding job satisfaction, and we've got a variety of options up there. Put

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your answers in and, again, we'll use this in the conversation later on with the rest of the panel.

So far, people are excited about having exciting work, which I think is something that Katie mentioned earlier. She certainly works in an area that's constantly changing and evolving. The location and telework is definitely a big topic, and we'll be curious to see if other people click in with answers in other areas. I see those bars shifting. Workload, salary.

All right, I like to see extra people answering. Thank you so much for answering this poll. It's going to be very useful for us. One of the things we're really focused on here at NRC as I mentioned is these retention things and how we can both emphasize what's attractive about the NRC to new folks and keep happy the ones that we have here.

Thanks for answering that question. Keep clicking it. You should be able to see it on the right-hand strip in your browser as you're watching this.

And by the way, I see a couple questions chime in the Q&A box. Please keep those questions coming. We will be using them later on as we have

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the panel discussion. And so now I'll go, while you keep click polling, I will introduce our next speaker.

Next up, we will have Dr. Kathy Held. Kathy is the president of the National Council on Radiation Protection and Measurements, or NCRP. She's also an associate radiation biologist in the Department of Radiation Oncology at Mass General Hospital and associate professor of radiation oncology, radiation biology at Harvard Medical School.

Kathy earned her Ph.D. in biology from the University of Texas-Austin. For several years, NCRP and its partner organizations have been sounding the alarm that there aren't enough radiation protection professionals, and Kathy's going to update us on how NCRP is helping us to meet this challenge.

Take it away, Kathy.

MS. HELD: Thank you very much. I'm very glad to be here. I want to thank the organizers for asking us to participate in this really important discussion.

If I could have the next slide, please. I'm going to start out with a quick overview to make

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sure you all understand a little about NCRP and then go into some of our recent activities in this area.

So NCRP has been around for over 90 years now. We're an organization chartered by Congress in 1964, and we have 100 members as dictated by our charter.

But next slide shows that our mission is to support radiation protection by providing independent scientific analysis. I stress that word because we develop our recommendations and guidance independently of the government agencies or organizations that may fund our work.

I also want to stress that we make recommendations and guidance. We're not a regulatory agency like the NRC or the EPA, but we depend on a consensus developed by our many volunteers of leading scientists in the radiation sciences to develop our recommendations.

Next slide, please. Just summarizes that NCRP council members are selected because of their scientific expertise, not representing any specific agencies or organizations, and most of the work that NCRP does is done by volunteers. Hundreds and hundreds of hours a year by the people who serve

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as our members, who serve on our various scientific committees and our board and our program area committees and do reviewing and development of our documents.

We cover many, many areas of science as listed in the next slide, please. Slide 5. This is in here because I want to emphasize. I know this session is talking about workforce for health physicists, but I think it's very, very important for us to keep in mind that health physics is underpinned by a very broad range of expertise. That's what NCRP seeks to have in our membership and involved in all our work, and that we feel is really critical for the development of the health physics workforce.

You've got to have radiation biologists, that's me, so I'm going to list that first. But epidemiologists, physicians, risk analysis people, radiochemists as well as the health and medical physicists in the field.

And so NCRP, we have been very concerned about all of these underpinning radiation sciences areas of expertise and the workforces there as well as health physics because they have such a large impact on what happens in radiation protection and in

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health physics.

One of our first activities a few years ago into this, next slide, please, was in 2013 when we helped organized sponsor a workshop that was held in, and you'll recognize a number of the people probably here in this audience and were involved in the workshop. We had this workshop entitled, Where Are the Radiation Professionals, WARP. Since then, NCRP has talked about WARP.

As a result of that workshop, we've published a statement in early 2015 that's available on our website for you to look at that were some of the recommendations from this meeting about the workforce in the broad radiation sciences areas.

So NCRP has followed up on that, next slide, please, with setting up what we call Council Committee 2, meeting the needs of the nation for radiation protection in terms of the workforce underpinning radiation protection.

So the goal of what we anticipate as being a long-standing committee is to assess, revise and renew the plan started with WARP to look at radiation fields and the dwindling numbers of radiation professionals in many areas. And we're

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concerned about government, academia, medicine, private sector, industry, the wide range of areas that employed people in the radiation sciences as well as the types of individuals.

So what this committee decided to do is the first undertaking was to develop a commentary, which they're currently writing, on the guidance for the radiation protection workforce. They have separate chapters on medical physics, radiation biology, health physics, radiochemistry and nuclear engineering, radiation epidemiology and are developing looking at the workforces and making recommendations as they can in all of these areas.

One of the big challenges that this committee has encountered, and I think probably some of the rest of you have also, in trying to make recommendations and assess the workforce is that there really is a limited amount of solid, quantitative data in some areas on the workforces.

In some cases, that's because it's a very rapidly diminishing and small workforces. And again, I speak from experience with radiation biology. Radiation epidemiology are small areas. They're vital, I argue, for underpinning what health

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physicists do. But we are rapidly losing those workforces, but we don't really have good numbers, which is a challenge.

One of the other challenges, as shown in the next slide, please, that we are addressing and becoming acutely aware of in the last few years is the need to increase the diversity, inclusion, equity in our workforces. Again, all of these workforces that I've been talking about in the radiation sciences.

There was a very interesting session at the North American Regional Congress a couple of weeks ago specifically on how we could increase diversity and inclusion in the health physics and radiation sciences workforce.

I think a couple of the things that I brought out -- I had as take-homes from that was really that we all need to be increasingly aware of the need to work on diversity in our workforces and particularly to try to increase the participation of younger, more diverse individuals. That's building a pipeline.

It's been really interesting to hear the comments from the first two speakers about how their

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organizations are attempting to approach that, and NCRP is very eager to help to support such efforts with internship programs, mentorship programs and we'd be glad to work in innovative approaches interacting with all of you to try to develop new approaches for strengthening not just the health physics workforce, if I can make this argument again, but in all of the radiation sciences.

With that, my last slide just says my thank you and I'm looking forward to the panel discussion. Thank you.

MS. CLARK: Thanks so much, Kathy, and for the leadership that your organization brings to this issue and the structures or the products that you put out. We find that really useful, and I look forward to exploring that more in the Q&A.

Let's throw up our third and final poll question. This is really about the -- oh, people are already answering. Awesome. This is about the how people get trained and developed the best in your view.

So what do you feel is the most beneficial way for staff to gain the necessary health physics knowledge? Is it on the job out there doing

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it every day, rotations like Angela talked about, conferences and mentoring like Katie talked about, and Katie also talked about training classes. So I'd be interested to see your thoughts there.

Looks like fieldwork is really high on people's minds as well as on-the-job training, which is pretty similar. Just depends on the location there. I appreciate getting that feedback there. Again, thanks to our team of HPs here at the NRC who put these questions together.

These are questions that are hot on their minds and I see a few more people clicking in. Thanks for doing that. You can keep answering and we'll poll these up as we need to during the Q&A. A lot of votes coming in for mentoring, so that's good to see. Thanks for that.

All right, our fourth and final speaker is Dr. Tom Johnson of Colorado State University. Dr. Johnson has researched and taught in various areas of radiation safety for over 25 years. And I'll highlight that Colorado State is one of the universities that the NRC has given grants to in the past for scholarships and curriculum development. And this grant program, which Katie mentioned

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briefly, is one of our most important pathways to develop and recruit new employees.

Selfishly, we love to hire people from that grants program. And Tom will speak about his perspectives in education the next cohorts of radiation protection professionals.

Tom, over to you.

MR. JOHNSON: Thank you. I really appreciate you inviting me to do this. I'm a little dyslexic, so when I first read this I thought it said, health physicists untie, which I thought was going to be a super cool topic. But I read it a little more closely, so it's health physicists unite. So that's, well, interesting. Probably not as interesting as health physicists untying.

Next slide, please. This actually fits into the kind of the questions that you were asking in your poll earlier. Training is not the same as education. We often talk about training, and we can train people to do things but a lot of people ask me, what's the difference between training and education.

Education, we look a little bit deeper than learning how to do something, which is what was in that poll. Going out in the field and seeing how

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to do something. Education would be a deeper understanding of the theoretical underpinnings of what we do, and more importantly why we do it.

So it's not just following a checklist or seeing how something is done. It's looking into more of the underpinnings of why is it done this way and what would be the things that go into this as far as theory goes.

Another thing I wanted to emphasize is certification is important. I noted that you have a certification working group. That's awesome. This is exactly what I think our profession needs more of is people working together to become certified, to raise our education level so that we can better understand the challenges that are facing us in the future.

Another big problem -- well, maybe not a problem, it depends on your perception, is that there's no real specific job code for health physicists in the federal government.

As you noted earlier, Theresa had a great job announcement there. And one of the job announcements is physical scientist, which is where health physicists is typically categorized. There's

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no specific code for a health physicist.

General scientists can fill these requirements and quite often do. That is probably important right now because the shortages we're seeing.

What we're seeing out in the field, though, is that health physics is being slowly changed from a profession where you need an education to where one you follow checklists.

Because of the restrictions that are being put into place, because of the lack of health physicists, what we see now more and more is no scientific judgement. It's an outright following of checklists.

For example, in the NUREGs, it says that you need to follow the NUREG unless you come up with scientific information that would demonstrate a better way to show radiation safety and compliance with the regulations.

Unfortunately, a lot of people now feel that you must follow the NUREGs verbatim and there should be no deviation from this because we've become a checklist society.

Right now, I can tell you there are very

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few graduate programs out there. There are five ABA (phonetic) accredited programs, and there are a tremendous number of openings in health physics right now.

Let's go to the next slide. Now, Dr. Held talked about how there's not a lot of data out there. I've been working with the editor of Operational Radiation Safety, he's an alum of our program, Dr. Craig Little, and we've been collecting job announcements.

In fact, I've been collecting job announcements now for over 15 years. We've been trying to track the trends as to what's going on.

Last year, we did some tracking on this just out of curiosity to see what would happen and see how many job announcements were there, unique job announcements, over an eight-month period of time.

Next slide, please. I can tell you this trend has not changed. That eight-month we selected had 643 unique job announcements for health physicists. I can tell you I just sent out job announcements this morning to our alumni, and this has not changed.

In that eight months, there are 125

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denoted as technician jobs and 194 for health physicist. And the job titles varied tremendously, but what we look more so was job description. And the job descriptions we reviewed pretty carefully to make sure that we didn't include anything with nuclear engineering or medical physicists because we wanted to see what was going on in the health physics profession.

And what we found is that we're getting about 80 unique postings per month with about 16 for technicians and 64 for professionals every single month. Now, this is nationwide. I can tell you that this is not changed. If anything, it's gotten worse.

We've seen more and more job announcements. I'm sending out probably on average almost 100 unique job announcements per month in health physics, and I can tell you we are not graduating 100 people per month.

At best, I think we would be graduating between four and five students per year right now. A lot of this is due to the wonderful programs the NRC has provided us with for funding students.

If you go to the next slide, you can see where people are getting these announcements at. So

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these are the announcements. You can see a lot of them are for industry and other. So it's not just the federal government. It's not just national labs that are hiring, although these are the bulk of the hires. One of the things I can tell you is state government jobs tend to be significantly lower pay than any of the other jobs. Because of that, it's very difficult for them to attract any health physicists that have had formal education.

The higher paying jobs tend to be at the national laboratories, and this is what attracts the bulk of our students. They tend to go to the national laboratories.

As far as what attracts people to come into the program, funding certainly is a key thing, but I can tell you it's become extremely difficult to attract any students. The other professions are much better advertised and most people know what a computer scientist does or a hedge fund manager.

These other professions where people go in that have the high skills that we need and we're simply, I'm not going to say outbid, but we're out-advertised. I think we're one of the best kept secrets that's out there.

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With that, I'll conclude my presentation unless someone has any questions. Thank you very much again for inviting me. I really appreciate the chance to speak here.

MS. CLARK: Thanks so much, Tom. I really appreciate you highlighting those issues. I think we're already getting a bunch of questions in the Q&A box. Please keep your questions coming because now we have reached the Q&A portion of the presentation, so we could have all the panelists here for Q&A, and I will moderate. I have a few questions already to get us started.

I'll mention one just because it was very relevant to what Dr. Johnson just presented on. The job code for health physicists, and we got a question in the Q&A and I was going to mention as well there is a specific series for health physicists that we use here at the NRC. That's the 1306 series. So while you were talking, I went into USA Jobs and I searched for 1306 and I saw something like 16 jobs pop up.

What that doesn't cover, however, is the other related fields that Kathy mentioned. So the NRC, our radiation biologists are quick to jump up

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and say that's what they are. They're not health physicists. They're radiation biologists. And so that would fall under a scientific series as you mentioned, Tom.

I just want to mention that so that folks are out there searching on USA Jobs or on other sites, they may be able to look for that 1306 series.

Let me start off with what might be a topic, and maybe I'll point it to Angela first. Tom just mentioned the pay in state government, and I saw you nodding along when we were off the stage. What thoughts do you have on that? How do you attract and retain people when pay might not be the motivator but there might be lots of other motivators to come work for the state?

MS. LEEK: Yes, thanks so much. The thought that jumped right to my mind, and Tom was spot on with that, that's one of the reasons that we are focusing in CRCPD on what can we do to fill the gaps. We know that there will be gaps.

When we feel them, the states are probably the first ones to feel it because we we're not going to have the money or the resources to attract. What we try to leverage is there are people

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that want to work local.

Depending on what agency we're in, we could be in environmental protection, we could be in public health, and we are all over different agencies. We try to say you're going into your neighborhood and helping your family and friends, the public service aspect of the job, but that only speaks so far to someone trying to money in a career. But there is value in the states' programs and what the states are able to do.

I think if we can leverage certain expertise that might be more -- the people with the stronger education are going to the national labs or going to these other places, that's where we want to find ways to leverage in so we can train staff.

And if one of the states is lucky enough to entice someone to come to work for them for those public service and other local needs at a lower pay than they could get somewhere else, then we can all leverage that knowledge as well.

There's not a lot we can do about that within our various states. Again, there's influences that drive that. But we are all looking at that and working on that as well.

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MS. CLARK: Thanks, Angela. It's something the NRC is thinking about, too. We're hooked to our federal pay scales, but we see the same sort of public service motivation and helping. So we're trying to emphasize those talking points when we market our opportunities and not focus solely on pay, which is something that's obviously easy to compare. Sort of along those lines, we got a question here, Tom, from the audience about how you're helping advertise job postings. How can we better advertise? What sort of outside-of-the-box ideas that either you or anyone else on the panel have for how to make our positions known to folks?

MR. JOHNSON: I wish I had an answer for you. I don't think the problem is making the positions known. It's getting people qualified. It's actually getting people into the program and I wish someone could give me some help advertising the different programs. That's really the biggest problem, I think.

MS. CLARK: Thanks. And definitely another question on that. Anyone from the panel want to add in on advertising current vacancies and creative ways we can do that?

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(Pause.)

MS. CLARK: I know for us, we're trying to use our agency and personal social media a little bit more. We've been sharing postings with communities outside the NRC like veterans and with the states and that sort of thing. So hopefully collectively if there are qualified folks out there to Tom's point, we can get the word out to them and not miss them for an opportunity that they'd be interested in.

MS. LEEK: Theresa, I'll add in there that also to the state perspective, some of what we try to do is leverage the networks that are within the state system of our existing staff, obviously some of the draws people that want to stay in the area want to live in Iowa. And so we try to leverage through those networks with the opportunity of learning or getting education or those sorts of things.

I try to, when I'm recruiting someone who might be coming from a very specific radiation protection field, help them find areas that they're interested in because our programs cover the broad spectrum of the regulatory world of radiation

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protection as well as emergency response.

If they find something that they're really interested in, I'm supporting them to go get college education, to go get specific certifications and those sorts of things and try to make it possible for them to do while they're doing the job that I need them to do as well.

MS. CLARK: Thanks, Angela.

Now, for the thought of advertising to people before they're in college or done with college, do any of you have thoughts on what we can do at perhaps the high school or even middle school level to get people interested in these career fields?

We don't want to wait until it's too late to get people excited, although maybe it's never too late. Are there for example already activities underway with teachers or with state curriculum development that you're aware of that we might be able to expand? Anyone can answer.

MR. JOHNSON: I can answer a little bit. We've run high school programs now for at least 15 years at Colorado State University. I've been involved in teachers workshops back since about 2000.

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I can tell you I've tracked whose come into at least Colorado State University, and we have not had a single student come to the university based on any of our efforts at the high school level. It's unfortunate, but true. I don't know if any of them have entered the profession. I try to track that, but we've had absolutely dismal results. We've worked with, let's see, multiple high schools in Colorado, we worked with the schools in New Mexico, and we've had absolutely zero results in recruiting at that level.

MS. CLARK: That's too bad. Anyone else have ideas or different outcomes that they want to share?

MS. TAPP: I might have something to share just from historical knowledge. Granted I was in high school a long time ago now, dating myself. But I actually joined nuclear engineering straight out of high school and interested in that because when my brother applied to the university ahead of me, he didn't get into his engineering field, but they sent back saying he could go to any other engineering field at the school and they sent a flyer.

The nuclear engineering program sent a

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flyer with it, and I remembered seeing that. And it was an interesting flyer just with pictures and whatnot. The advertisement really sold me on seeing -- suddenly, there was interest in me. And actually thinking back on that flyer it was a lot of health physics pictures because there was people taking surveys out in the field that looked nice. An adventure person, they sold it that way, which I thought was interesting.

So really just getting pictures out there of health physicists at work at the high school could entice a few people to at least start looking into the field and considering it.

I'm a little shocked that going to the high school level hasn't drawn people into you. I would have thought that would have worked differently. That would have been my first thought.

MR. JOHNSON: I don't know, maybe it's just me.

MS. CLARK: Thanks, Katie, for that.

No, I'm sure that's not the case. And that reminds me. True confessions, I'm not a health physicist. I'm a materials engineer, at least by degree. And we had some of the same challenges in

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recruiting for our very small materials engineering program at my university.

We very actively went after undeclared engineering majors to say, you probably never heard of this, here's materials, here's free pizza, here's some information about the field. And we got a lot of people that way. There may be adjacent fields that we can draw people in before it's too late.

MS. LEEK: I think Tom mentioned earlier that we're the best kept secret is spot on. I think we need to create characters or something that people can resonate with. When you say x-ray tech, people have had an x-ray and they can imagine what that person is doing every day.

When you say nuclear engineer, people who aren't in our field don't know what you would do every day. And they wonder, are you just pushing paperwork, you know, what are you doing. I think if we could create little snippets of what people could resonate with when they see those terms.

But we're really a complicated field, so that's hard to do and we're very diverse. But if we could start parsing it down and targeting people when they're younger and thinking about their careers,

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they might select it, knowing kind of what they're getting into, potentially. So I think that's a good idea for us to do.

MS. CLARK: Yeah, and those diversity of opportunities is a real selling point, especially for people who don't want to lock into doing the same thing for the next 30, 40, 50 years. I mean, there's a lot that you can do with these fields.

Angela, I'll go back to you for a second. One of our sharp-eyed commenters noticed that we've had some rotations in the past between states and the NRC. It may be like ten years since we did one with the state, and some of that is probably just due to our reduction for a while in entry-level hiring when people are really looking for these rotations.

Angela, can you talk a little bit about what already has happened that might form a model for other things going forward?

MS. LEEK: Yes, for sure. Just in high level generality, the NRC and Agreement States partnership has been really strong. There's been a lot of work to leverage across the national materials program, especially in the last decades.

As far as specific rotations, fellowship

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rotations, things like that. I can't point to names or states specifically, but you're right. There have been opportunities where both directions have occurred. But more recently what I'm aware of, I know we've had a couple of agreement states that have had new staff rotation in the NRC. I think Nebraska has really recently deployed someone there to help train some of their staff and help them with some of the work there. I think we're going to talk about that at our organization of Agreement States meeting coming up as well.

So there are things underway and states are leveraging. But right now, it is kind of who you know to call. So if you're an experienced radiation control program director or you've been with the state program for quite a while, you know to call your neighboring state or your friend across the way that you met at a conference. Of course, we haven't been able to go to conferences to create those networks as efficiently and as effectively as we have in the past. I think what we want to try to do is to help foster those engagements, foster those connections so that when someone needs something we can foster more of that to happen. But it has

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happened quite a bit and very effectively. So we have a good foundation to build on.

MS. CLARK: Thanks, Angela.

Kathy, I want to bring you into the conversation. One of our listeners -- and thank you for mentioning diversity, equity and inclusion, and was wondering how do you envision us achieving these goals. Either through what your organization is doing or ways that any of us can do better in this area.

MS. HELD: I think that's the key question right now, isn't it, is to figure out how to do that. That was really some interesting discussions that went on as I mentioned at the IRPA Congress, and Angela was part of that too a couple of weeks ago.

I think we're all asking that question. How do we achieve a better diversity? The main thing I can think of that we're trying to facilitate is really getting at these younger people and building a pipeline and identifying a more diverse audience, a more diverse studentship that we can attract to our field.

I don't have any magic bullets for how we

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do that. That's the frustrating part of all of this. I think to some degree, Angela is just sort of alluded to it, it comes down to personal interactions.

Each one of us and all of our organizations need to strive to make the personal connections with younger people, with women with minorities and foster bringing them into the field, making them feel welcomed in the field and developing their expertise, and most importantly their interest.

Can I ask a question?

MS. CLARK: Sure.

MS. HELD: I have a question really because of something Tom mentioned. That was the idea of the difference between training versus education, and then he thinks health physics is really going towards checklists and everything is training. You know, train how to check off your checklist.

Is that impacting the interest in the job? Does that make people less wanting to do a job where all they do is go down a checklist and check things off and check things off. Would they rather have a job where they are educated and they can think and apply their knowledge and understanding to

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problems rather than going down through checklists?  
Do you think that's part of the problem now with some  
of our fields?

(Pause.)

MS. HELD: Nobody is going to try to  
answer that?

MR. JOHNSON: I'll go out on a limb. I  
don't think it is a problem because I just can't get  
people to come into the program or even apply. We  
have trouble getting anyone even to apply to our  
program. There's so much competition.

I can tell you our really big  
competition, I think, is engineering in the other  
sciences. They do a better job of promoting what  
they do. You can see it. Someone says mechanical  
engineer, they kind of know what that is and they're  
going to go in that direction. As it was said  
earlier, these are our people that we'd like to see.  
The undeclared engineering majors are perfect  
candidates for us.

We scare off a lot of people because  
we've got calculus requirements, we've got physics  
requirements, and the people who can do that know  
about other professions and they tend to go with what

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they know rather than something they don't know. I don't even think we get looked at.

What I'm worried about is I can't get an undiverse population to apply, let alone a diverse population. I can't get anyone. I'll be honest, we have, this fall, I think we've got four students starting in our graduate program. That's radiochemistry, health physics, and radioecology. That's four students. We have much more capacity than that, and it's dismal. I think we had 20 applications to our program total for the fall.

MS. CLARK: Katie, I saw you nodding along when Kathy was asking her question. I know you've done some work where you've really had to think outside of the box and outside the checklist. Do you want to add in?

MS. TAPP: Yes, I do. I do think this is a problem for retention. I think when I first started, I thought a lot of the questions were already solved and it wasn't as exciting. I know I hear that from staff in different areas. Once I got a little farther up and actually had to apply knowledge, I find it so exciting.

To me, exciting work is probably the most

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important thing. I know it varies to people, and maybe that polling question could answer some of this. But if I had to do checklists every day, I probably wouldn't have stayed in the field. That's for me.

MS. LEEK: Theresa, I'll jump in here, too. I think the checklist world that we've come into I think is a result of us needing to continue to make sure we have a basis of consistency and the ability to keep that basic radiation protection in place.

I think if we can sell it and we can foster more engagement, we can offer more flexibility. I think also creating that network. When I think about Iowa, we don't have any big, fancy national labs. The closest would be into Chicago. We don't have big industries that are specific to radiation, except maybe a nuclear power plant.

If we wanted to try to entice people to go to a program, but they knew they wanted to come back to Iowa or to a state like Iowa that doesn't have that job, I think they can't figure out what job they would get. And then when they look at what jobs there are at the state, they don't pay very well, and

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so then they're enticed to go to another career path.

But if they would just start down the career path, they would see the open, diverse application of the type of things that they could do with that knowledge base. So if we could just get them in.

And I think if we could create this network, what we're trying to do with CRCPD, to show that, look, you might work in Iowa, you might work somewhere in Iowa, but you have the ability to tap in and work very closely with the NRC and influence things in the NRC. And you have the ability to work with your university to provide this sort of education and feedback or research or something that keeps them engaged in that technical knowledge that brought them there.

Even if they are in a position that isn't as fully diverse and engaging as they would have liked. We can create opportunities with each other when one of us can't do it on our own.

MS. CLARK: Thanks, Angela, for that. Since one of you mentioned the polling question, if one of our techs is able to pull up Polling Question 2, I'd be curious to see what the results were because

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I think challenging and exciting work was pretty high up there. Yes, that one there.

So location is important and Angela was mentioning that. If you grew up in Iowa and you want to keep working in Iowa, then that's going to be a big factor. I think Angela will be really glad about that. But challenging and exciting work is right there. That seems like something that we all can focus on when we're describing our field and talking about that breadth of opportunities that are there in our field. Thanks for bringing that poll up for a second.

Let's see. Angela, I don't want to keep going to you but there's sort of an interesting related question. This is perhaps partly for the NRC, but the questioner directed it to you.

What are your thoughts on cross training folks who were in a reactor-focused health physics area into a materials focused health physics area and vice versa?

I can speak to what the NRC is doing, but I'm more curious on your thoughts first.

MS. LEEK: I think that's a very specific application from the reactor to the materials and

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vice versa. I think as was spoken to by Tom and Kathy, there are all types of radiation protection activities happening that are foundational to what health physics is.

I think that there is a core knowledge, and if we can make sure that those understandings are in place for our health physicists or for our radiation biologists or whoever's coming in and they've got those core capabilities, having the ability to go to an area that interest you or help cover an area that's different.

It grows you, gives you a different perspective on how the world works on that side of either industry, regulation or whatever you might be in. I think that that should be fostered. We should try to do that as much as we can.

But again, I think that that interest is the big piece, right. If someone is being cross trained into something they're not interested in, that's not going to be fun for them. So how do we balance that where we have the need and we have the desire of the individual.

MS. CLARK: Thanks for that.

Katie, I saw you nodding too. You

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mentioned this in your presentation. Maybe you have a thought from our HP community here at the NRC, which includes folks in those specialties?

MS. TAPP: Yes. I'll just piggyback what Angela just said, it's really about interest. For those interested in learning about different areas, if they have the core knowledge, it's working really well.

It's allowing people to maybe look into another side of the house, another specialty or subspecialty of health physics and learn more. They could either then move into that or use that knowledge they gained there to support their area.

So we're finding that it's really helpful for people who are interested in it, helping them retain knowledge from different areas and move it around.

I think some people are really excited to try something new just for a little bit and it helps maybe when they're a little lagged or just feeling that they've been in one place for a while just to kind of branch out and learn a little bit more.

So it does help with retention as well. I heard a lot of people excited to learn a little bit

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new things, even if they don't plan to stay.

MS. CLARK: Thanks, Katie. Thanks for providing that perspective.

Kathy, a question for you. As folks were listening along to your presentation, they heard you describe this 2013 workshop and a report from 2015, which frankly was raising a lot of the same issues that we're talking about here today.

What opportunities have we missed? What recommendations were there in that timeframe that maybe we didn't capitalize on as much as we could have? We're still talking about this, so what more do we need to do in your perspective?

MS. HELD: I wish I could answer that question. I think the problem is that we identified a lot of problems with the workforce and how in certain areas it was really diminishing, the numbers of people. And that hasn't changed. Again, from my own personal experience, I can speak about the small fields, like radiation biology, radiation epidemiology, radiochemistry.

Radiochemistry seems to be staying level. Epidemiology's gone down. Radiation biology has really gone down. I don't know what we can do to

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counter that. That's been some of the frustrations.

Some of the recommendations: were trying to get more government engagement and interaction to build a nationwide program to try to facilitate these things. But, you know, all of that takes money. And that's part of the challenge with trying to develop some of these problems that -- some of these fields, these approaches, we need more dollars. Because one of the things that we were hearing, from time to time, was that people weren't attracted into some of these fields because they just weren't sufficiently paid, high enough pay. And we talked about that specifically for the states.

But I think that's an issue for some of the academic positions and so forth, that people get into them because they really care about the field, and they're frustrated because they sometimes don't feel like they're being compensated as well as they would be in other fields.

And we also need government support, something to give us more of an umbrella to be able to bring these various groups together to try to work out on how to solve some of these problems and figure out how to develop educational, as Tom has been

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saying, how to develop outreach that brings these young people into the program.

I don't think we've made much progress at all, unfortunately, in the last almost ten years now. I hate to be a pessimist, but --

MS. CLARK: Well, it's a realist and it's a call to action for us as we're seizing these opportunities. We talked about getting people at the early stage before they have a career, what if people were in an adjacent field.

Katie mentioned that she was nuclear engineering. Someone's in kind of a related field and they want to get into this. How can they break in? What ideas do you have for maybe getting a certificate or getting a night school degree or just doing it on the job. How has this worked in the past?

I know, Angela, you talked to me about this in the past so you might want to start, but others may want to chime in.

MS. LEEK: Sure. I mean, I'll share. I started from an ancillary position from high school. That's why I used this example. I knew what an x-ray tech did. I knew what an ultrasound tech did.

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That's what I decided I was going to do.

I got into that field and really liked the radiation part of it, but I didn't really know anything more than that. So when I did join the state, I realized there was this position called a health physicist and that's when I was able to start to explore that avenue.

And Oregon State has a distance version of their health physics program, which made it possible to continue to work and also explore and get the education in health physics with my master's degree and then also eventually getting certified.

But I wasn't in a position in my life at that point to want to leave and go to full education. Although it was a big lift to do a master's degree and work, and not everybody's willing to take on that level of effort.

But having that avenue and that path that didn't make me have to stop my career at the same time I wanted to explore a new pathway was beneficial and has really benefitted me to get to where I am here today.

That's what I'd like to foster for others who've gotten into a career path and like it or like

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an aspect of it that's ancillary to what we do and what we need here in the radiation protection world, health physics specifically too, and help them navigate without having to do major life changes to get to us. Because if that's the case, they won't. I think that that is what we need to look at for that community.

MS. CLARK: Thanks, Angela. Anyone else want to add in that thought?

MR. JOHNSON: I recommend people pursue getting certified. The degree requirements for that are pretty liberal, and it demonstrates a level of competence, even if you pass Part 1. I think that really makes a big difference.

I stay in touch with employers and I can tell you that one of the employers I just talked to said that she had a lot of applications for her job. It was a very desirable job in a desirable location. And she only interviewed CHPs.

Conversely, I had another one of our alumni who was interviewing people for a health physicist job. He had over 150 applications. He said all of them except one were nuclear engineers looking to become health physicists. If they were

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certified, certainly he would have considered them differently. But it's a big difference.

MS. CLARK: That's really interesting, Tom. So what are some examples of the related degrees that you could have and still get certified? Like nuclear engineering, perhaps. Obviously maybe biology or something like that?

MR. JOHNSON: Yes, if you look at the ABHP website, they've got a list of the people who took the CHP exam this, I believe, this past year or at least in the last two years and the degrees that people have had. It's a very large variety of degrees. They also denote their success at passing the exam, which isn't always as good.

MS. CLARK: Well, hence the study group, I suppose.

MR. JOHNSON: I hope they're very successful. I really enjoy seeing people pass the exam. It's a great sense of accomplishment, and I really feel that it's a demonstration of someone's dedication to studying the profession and really, really learning the nuts and bolts and the theory behind it. It is, I believe, part of an education rather than training.

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MS. CLARK: Yeah, and I'll throw a plug in. I know that, Tom, your training program for studying for CHP was one of the main things that helped me get through Part 2. So I think creating more of those things available to people to do on their own time and really take the effort to grow are the types of things that are going to be helpful.

So what the NRC is doing internally for NRC, but some of the things that you've done, Tom, I think are ways that we can reach our community.

MR. JOHNSON: Thank you.

MS. CLARK: So this is an NRC conference, so, no promises on anything, but how can the NRC help with these issues? What can we do as one piece of the federal family to help with a lot of -- there's been a lot challenges raised today.

MR. JOHNSON: You know, the NRC, back in 2000 -- maybe it was 1999. Okay, it was 20 years ago. I took a CHP review class at White Flint. It was sponsored by the NRC. The local chapter of the Health Physics Society was running a little short course. They met on, I think, on Thursday nights. And there was a gentleman, I'm not sure if any of you have heard of him, his name was Charlie Willis. He

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was running the course and it was quite a good experience. I think your study program you're already doing internally is a great way to kick things off, get people excited and keep them motivated. It's tough.

MS. LEEK: I think that at least on the material side of the fence and CRCPD and other radiation protection groups will need to try to fill in the gaps for the nonmaterial stuff. But you guys touch every piece of the materials world from reactors to materials uses in industry and medicine.

I've seen some things, actually, on your social media where you're highlighting what people are doing in their jobs. Like, there's a picture of them sitting at their desk. I've seen some of those things come through.

I think the NRC is in a good position to maybe develop some of those characters or key things that people can identify to what are people doing in the NRC or even with some of our licensees.

We can go and say, what do you do every day? And make them a person. Make them the physician. Something that's recognizable to the community.

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I think maybe some effort in drafting some of those things that we can use then use to go out to the high schools or to the other college departments and try to navigate that. I think that just takes resources and effort and development. I think if the NRC has the resources to put toward that, it would be helpful.

MS. CLARK: Thanks for those ideas. Perhaps our last question, depending on how many answers you all give, I'll start with Kathy and then everyone else can have an opportunity to double check and I'll check through. We just got another question, too.

If on this broadcast someone is a high school student or a college student, I think that's at least a conceivable possibility, and wants to learn more, thinks this is interesting but doesn't even know where to go next to find out more information. Where would you recommend those folks start to learn more about this field and how they might grow within it?

Kathy, do you have thoughts?

MS. HELD: Well, my email was on my last slide. They can always email me and I'll do my best

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to get them to a right person or a person who hopefully could help them that's affiliated with NCRP from somewhere in their area.

I think that all of the professional societies that I'm familiar with in the radiation sciences are really trying to do ways of outreaching to younger people. I think that's what we really need to encourage is to get -- when young people approach us, get them in touch with someone who's really into education in the professional societies.

As I said within NCRP, I know a number of individuals like Tom, for example, who are really into education and are really eager to reach out to younger people, to high school and early college folks. It's our network.

We're a small enough field that we can really take advantage of our network. I can call up, I can email people all over the world to get them to help. It's just a case of trying to use our networks.

So when we get these, hopefully, get younger people to reach out to us, they'll talk to each other and really try to encourage those people.

MS. CLARK: Thanks for that. While Kathy was talking, I realized that the question page

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updated late with a bunch of questions. I'm going to try to throw in a few more questions so that people don't feel like we're ignoring them. We weren't.

First, an easy one for Tom. Do you have a good email address to submit questions about radiation protection jobs in Colorado? Would you be willing to share your email?

MR. JOHNSON: Yes. Should I just put it in the chat?

MS. CLARK: No one can see the chat. So say it out loud if you want.

MR. JOHNSON: It's just [TJ@colostate.edu](mailto:TJ@colostate.edu).

MS. CLARK: All right. Hopefully that person heard that and is excited.

MR. JOHNSON: I always tell students, there are no radiation jobs in Colorado, typically.

MS. CLARK: Well, it was worth a try.

MR. JOHNSON: Yes.

MS. CLARK: We have a couple of questions, and I'd be just curious if any reacts kind of from the idea of branding and describing this field in a way that really gets at the diversity of work.

People were suggesting what if were

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radiological engineering and health. What if it were radiation protection advisor versus health physicist. Does anybody have thoughts on that? Is that just window dressing or is there something to that idea?

MS. LEEK: I think there's a diversity of jobs, right. I think any of those could probably fit whatever job is happening. I think it's linking that health physics degree gets you to those things.

I don't know if we need to change the term health physicist, per se, but we need to help people understand what it means and give them some sort of a picture. That might be developing some of these different modes of what's an RSO versus an inspection person versus a laboratory analyst. But all of it could fall from health physics. But again, just linking that back, I think.

MS. CLARK: All right. I'm just scrolling it to make sure we don't miss anything else big. If we missed your question, it was only because I was trying to combine it with something else.

So, we have just a couple minutes left. I just wanted to leave the opportunity for each of our four panelists, if there's anything that we didn't ask a question about that you want to mention

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or something that you want to promote from your own organization, like a job posting like I took the advantage of, I'd be happy for you to take that opportunity.

So, Kathy?

MS. HELD: I don't have anything specific. We're here looking -- at NCRP -- looking for a pipeline, looking for new individuals to bring into our work scope. We started a program for internship or starting to try to do more mentoring of college kids, graduate students.

Anybody who's got students who might be interested in internships or mentorships through NCRP, please give me a buzz. We'd love to try to work with those -- I'm an educator at heart and many in NCRP are, and we really are trying to reach out and bring out a lot more new and young people.

MS. CLARK: Thanks, Kathy.

Tom, anything you want to add?

MR. JOHNSON: Just to add if anyone wants to email me with any questions, I'm happy to answer any questions, especially for potential students. They don't have to want to go to Colorado State. They can go anywhere. I just love to see more people

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get into the profession. We absolutely are hurting for people coming in.

MS. CLARK: Thanks, Tom. Angela?

MS. LEEK: Yes, I really appreciate the opportunity to share and to partner with all of you and all of our other partner who aren't on this panel. I think together we're going to be able to try work our way through this and solve it as much as possible.

My plug will be if there's anybody who would like to work with CRCPD on our efforts to plug the -- while we're trying to fill the pipeline, while we're trying to grow resources, if anyone wants to participate on the workgroup to help us navigate the interim, we'd love to have you a member and to help us figure out the best way to do that across our programs so we can maintain our skillsets while we try to build new ones.

MS. CLARK: Thanks, Angela.

Katie, final thoughts from you?

MS. TAPP: Yes, I just want to thank everyone for joining us and having the opportunity. Like many talked about, if anybody's interested in joining health physics at any level, really reach out to us. Even if you're health physics and you want

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just more diverse topics, reach out to the network. There's so many questions out there. There's so much need and you can have as much as you work. Just reach out and meet each other and grow your network and join us. Thank you.

MS. CLARK: Yes. NRC folks on the line, make sure that you're connecting up with Katie.

If we could put up Slide 5 from my presentation, which has my email and Daniel's email, I'll just leave that up there for a little bit while we're closing out.

But, finally, I want to thank all of our panelists, Kathy, Tom, Angela, Katie for devoting their time to prepare presentations, to get ready for this, to figure out the platform which is a little different than how a lot of us do meetings.

I appreciate the technical support from the conference organizers and certainly to Daniel and Dan who've been with us every step of the way to make sure that we could pull this off.

On the slide that's up there now, you'll see Daniel's email. He was the session coordinator. I'm sure that he'd be open to feedback on how the session went if there's not an official feedback

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form, which there probably is.

And then my email, [Theresa.Clark@nrc.gov](mailto:Theresa.Clark@nrc.gov) is there on the slide. Feel free to reach out to me and I can put you in touch with anyone who is on the panel as well as answer NRC-related questions. Don't forget about those jobs I threw up there, USAJobs.gov. It's your source for any NRC-related job opportunities as well as the rest of the federal government.

With that, we'll close out the session. Thank you so much for listening today and enjoy the rest of the RIC. Take care, everyone.

(Whereupon, the above-entitled matter went off the record.)