

Successful Nuclear Criticality Safety Mentorship Program

Introduction

As the Nuclear Criticality Safety (NCS) community grows older and large numbers of experienced criticality safety engineer specialists retire, there is a need for less experienced aspiring criticality safety engineer specialists to fill the gap. It is very important that the lessons-learned over the past ~50 years are passed on to the “next generation.” This can be effectively accomplished utilizing a nuclear criticality safety mentorship program. A more experienced criticality safety engineer specialist (i.e., mentor) should educate the less experienced criticality safety engineer specialist (e.g., trainee, or engineer). Mentorship should not end once the trainee becomes a qualified Criticality Safety Engineer or Senior Criticality Safety Engineer at his/her nuclear facility.

Mentoring and learning are not limited to less experienced specialists, nor limited to a period during the start of a career. Oftentimes seasoned professionals learn a great deal while serving as a mentor and gain perspective not available to them outside of a mentor relationship. The best careers have an element of learning throughout the entirety and therefore new and seasoned professionals can be gaining skills at any point in their career. It is an ongoing, continuous process while a member of the NCS community.

Mentorship is not limited by proximity or location. While there are requirements specific to a facility, a majority of learning can and does take place amongst professionals located at other sites and within other NCS programs. Development of mentor relationships across distance is encouraged and with regular meetings, conferences and technology that supports online connections it is possible to develop effective mentoring remotely.

Background

This white paper was identified by the ANS/NCS Education Committee as important to meeting the overall mission statement, “To promote development of nuclear criticality safety expertise by providing opportunities that offer technical growth and recognition.” One way to promote development of nuclear criticality safety expertise is to have an active nuclear criticality safety mentorship program, which may be a vital part of a trainee’s opportunity for future professional growth both in the field and within the facility organization.

General Discussion

The elements of a nuclear criticality safety mentorship program can begin as early as screening/hiring of a prospective trainee. This is not meant to imply that only those involved in the hiring process can be effective mentors. A potential mentor directly involved in the interviewing and hiring process may be committed to the mentorship program for years to come and the satisfaction of being involved in long-term development is significant. However, those not involved in hiring may also be in a position for long-term commitment. A mentor has the task of establishing a development program for the trainee, which includes meeting minimum qualifications and on-the-job training. The nuclear criticality safety community offers introductory and advanced courses in various facets of the field, much of which can be accomplished within a remote mentor relationship. Early in a trainee's career, it is important to get the basic training (e.g., critical mass data, facility indoctrination, computer code systems, hand calculations, consensus ANSI/ANS-series 8 standards, handbooks, hazard and risk analysis, ANS/NCS workshops, accident response).

In-house training may be performed by a mentor in formal settings (e.g., training classes, tutorials) as well as in informal settings (e.g., brown bag lunch sessions, required reading assignments.) A mentor must provide situations such that a trainee can become familiar with the fissile material operations at the facility and the people who are responsible for implementing the required nuclear criticality safety controls as well as can effectively interface at all levels of the organization.

One method that a mentor may use to share process nuclear criticality safety information with the trainee is the site familiarization process. This process develops important “interface relationships” between a mentor and the facility organization and it can be done in many ways (e.g., documented facility tours with operations personnel, process engineers, and other criticality safety engineer specialists; “shadowing” a mentor during formal audits and cross-functional business meetings).

Learning the facility-specific nuclear criticality safety processes (e.g., internal procedures; analytic tools; computer codes; documenting evaluations of nuclear criticality safety; determining subcritical margins; developing contingencies with production operators and support staff; documenting process hazard analyses and control implementation) is best learned with the help of a mentor who is willing to share their own insights and mistakes. An effective mentor guides a trainee through the education process and provides encouragement even in failure. Sharing lessons-learned can be a powerful tool to assist the process.

Professional interface and dialog with the NCS community at national and international meetings is strongly recommended for a trainee. It is an amazing opportunity to meet and listen to individuals who have influenced the development of the field of nuclear criticality safety over the years. It is also an opportunity to meet other trainees who are new so that they can share concerns and/or experiences. A mentor can assist the introduction of the trainee into this close-knit NCS community.

The NCS community is one in which senior professionals continue their own learning, including topics taught by less experienced professionals. Part of being a mentor is recognizing that the trainee brings skills and a viewpoint that can and should alter how a mentor would do a new task. Specifically, learning is not a one-way activity in these relationships.

Mentors can help trainees identify their place in the NCS community by jointly developing a vision and focusing on areas of continued development and participation in the NCS community, division governance, or development and evolution of ANS-8-series national consensus standards. Pursuit of continuing education/professional development can also be made easier for a trainee if a mentor is available to encourage, sponsor, co-author, or otherwise assist. It can truly become a growth experience for both a mentor and a trainee. Finally, a mentor should play a role in “recognition” celebrations, acknowledging when major training objectives, milestones, or accomplishments have been met by the trainee.

Examples of Attributes of an Effective Nuclear Criticality Safety Mentor:

The following are examples of attributes of an effective nuclear criticality safety mentor:

- Willingness to be a mentor
- Recognized “senior professional” in the NCS community
- Expert knowledge of the facility nuclear criticality safety basis for site-specific mentoring
- Commitment to the nuclear criticality safety field
- Coach, teacher, team-builder, and advisor
- Traits of being open, approachable, good listener, patient, and encouraging
- Accepting of own limitations and mistakes
- Commitment to the development of the trainee and the mentorship program
- Exhibits traits of trustworthy, honesty, and integrity
- Dedication to pursuit of beneficial contribution to the nuclear criticality safety function at the facility
- Ability to shape attitude and philosophy by actions and example
- Knowledge on the use of the ANS-series 8 standards

Examples of Attributes of an Effective Nuclear Criticality Safety Trainee:

The following are examples of an effective nuclear criticality safety trainee:

- Willingness to be a trainee
- Having the education commensurate with responsibilities
- Willingness to listen and learn
- Willing to share new discoveries with a mentor
- Willing to ask questions and admit lack of knowledge
- Energetic in pursuit of knowledge
- Desire to excel in the nuclear criticality safety field
- Desire to obtain “qualifications” to contribute to nuclear criticality safety function at the facility
- Willingness to give the time needed for the mentorship program
- Desire to be active in the NCS community
- Exhibits traits of trustworthy, honesty, and integrity

Conclusion

As an increasing number of senior criticality safety engineer specialists retire, the need for new criticality safety engineer specialists mount. One of the more effective methods to pass-on knowledge and experience in nuclear criticality safety is through an effective nuclear criticality safety mentorship program. There are many mentor relationships throughout a single career and they are not limited by proximity or to an individual's particular facility. Much can be learned from other professionals in the broad, international NCS community. Career success involves an element of learning throughout and senior professionals learn a great deal from others that may be less experienced. This continuous learning can bring some of the greatest rewards in a career, as can the joy experienced by assisting in development of others.

References

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