Best Practice Form

Best Practice Title:	**Use of a Remote Tapping Tool at Idaho National Laboratory to Minimize Worker Exposure and Avoid Future Contamination Accidents**		
DOE Site:	Idaho National Laboratory	**Facility Name:**	All D&D Facilities
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Interviewed by:	n/a	**Transcribed by:**	David Roelant & Peggy Shoffner

Brief Description of Best Practice: (Provide a short, "abstract-like" description of the best practice)

Deactivation and decommissioning (D&D) of facilities at U.S. Department of Energy (DOE) sites often require the draining of piping systems in high radiation areas. In these situations, long-reach or remote tapping tools can be an effective means of keeping radiation exposures or doses as low as reasonably achievable (ALARA). Working with S.A. Technology of Loveland, Colorado, CH2M-WG Idaho, LLC (CWI) personnel developed a long-reach remote tapping tool for attaching a tap-and-drain assembly to a piping system in high radiation areas.

This best practice describes the development and then use of the remote tapping tool at Idaho National Laboratory to address the need for safely tapping piping systems in high radiation areas by increasing the distance from radiation areas and reducing the dose rate to the deactivation and decommissioning worker, improving worker safety and potentially reducing personal protection equipment requirements.

Trench exposing underground piping system.

Piping system containing contaminated liquids.

Summary:

During 2010, in an area behind the TRA-632 Hot Cells at Idaho National Laboratory (INL), deactivation and decommissioning (D&D) workers drained underground piping systems that contained highly contaminated liquids. The main contaminants of concern consisted of Co-60, Cs-137 and Eu-152, -154, and -155. In order to drain the piping prior to removal, a D&D worker would excavate the area around the piping to enable the application of a tap-and-drain assembly. D&D workers used dirt and lead blankets to shield against radiological dose rates up to 10 R/hour at contact.

CWI personnel worked with S.A. Technology to develop a remote tapping tool that can be operated from a distance when attaching a tap-and-drain assembly to a piping system in high-radiation areas. The intent of the design is to modify proven technologies with an off-the-shelf hot tapping device for drilling contaminated pipe. The pipe saddle is another commercially available item, which has been slightly modified to allow for its attachment to the pipe from a distance of 5–7 ft. The pipe saddle, hot tap, and drain are all assembled prior to its installation. With the assistance of a long-handled tool, the operator installs the saddle on the pipe while maintaining distance from the radiation area. The unit has been fabricated to be as lightweight as possible to maximize the chances that it can be operated by a single person without the aid of lifting machinery. Any required drilling, fastening, and actuation can be accomplished with commercially available hand-powered drills. The drain valve handle can be opened and closed with a separate and simple long-handled tool.

Funding received from the U.S. Department of Energy Office of Environmental Management and managed by the Office of Deactivation and Decommission and Facility Engineering (EM-44) facilitated the development of the prototype long-reach tapping tool.

Variations of this tool were deployed at the INL during 2011 and 2012 to tap/cut NaK lines remotely in the EBR-II vessel.

Why the best practice was used: (Briefly describe the issue/improvement opportunity the best practice was developed to address)

The best practice was used to effectively incorporate as-low-as-reasonably-achievable (ALARA) principles to improve worker safety and reduce personal protection equipment (PPE) by increasing distance from the radiological source and reducing dose to workers.

What problems/issues were associated with the best practice: (Briefly describe the problems/issues experienced with the initial deployment of the best practice that, if avoided, would make the deployment of this best practice easier the" next time".)

Testing of the prototype was conducted with input from D&D workers who used the tool in the field. The worker input was used to further refine and lighten the tool.

How the success of the Best Practice was measured: (What data/operating experience is available to document how successful the best practice has been?)

The remote tapping tool has been implemented at the Idaho National Laboratory and has been successful in increasing the distance of the D&D workers from the high radiation area when attaching a tap-and-drain assembly to a piping system. There have been no adverse safety effects as a result of following this best practice. In fact, the hazards to the worker have been reduced as a result of increased distance from high radiation areas. The long reach tool allowed the cutting of a dozen NaK lines in the EBR-II reactor. This was an inert (argon) area with limited access. The lines were cut and drained using this tool without having to physically enter the immediately-dangerous-to-life-or-health (IDLH) area.

What are the benefits of the best practice: (Briefly describe the benefits derived from implementing the best practice.)

Long-reach or remote tapping tools can be an effective means of incorporating principles of keeping radiation exposure as low as reasonably achievable (ALARA) by increasing the distance from radiation areas and reducing dose rates to the D&D worker. This technology also improves worker safety and reduces personal protection equipment requirements. Modifying existing, proven technologies for D&D applications has the potential to reduce the cost and accelerate the schedule for D&D.

Alternative solutions considered: (Other solutions to the issue/improvement opportunity considered prior to implementing the best practice?)
Alternative solutions to the use of a remote tapping tool to drain pipelines include the use of dirt and lead blankets to shield the workers from piping with high radiological dose rates. In the application that the long reach tool was used at the INL, workers would have had to use a self-contained breathing apparatus (SCBA) or "bubble hood" and been hoisted into a radioactive field with oxygen levels less than 1% to cut these lines. NaK is highly reactive with oxygen and also water. The more distant proximity of the worker to these lines during operations significantly lowered the worker risk from explosion, fire and dispersal of nuclear contamination.

Additional Information	
Reference:	Development of a Remote Tapping Tool at Idaho National Laboratory, January 2011, RPT-785, Revision 0.
Technology Links:	
Vendor Links:	Formerly SA Technology Inc. (www.satechnology.com), now Machine Design Solutions Inc. (http://www.machinesolutions.biz/)
Videos Pictures:	
Comments: SA Technology has gone out of business. Inquiries about this best practice should be directed to the INL site contact as shown in the Best Practice header.	