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Technical Basis for Implementation of the PCM-1B for Personnel Release at Tank Farms

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Abstract:

This document provides the technical basis for use of the PCM-1B as the sole method of personnel release from Contamination Areas at River Protection Project facilities.

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1.0 Purpose

The purpose of this document is to define the technical basis and implementing guidelines for using automated personnel contamination monitors, such as the PCM-1B, at the River Protection Project (RPP) in lieu of performing a hand-held instrument followed by a PCM-1B survey for personnel release from contamination areas requiring a beta-gamma whole body survey. This document provides the basis for full implementation of the PCM-1B release survey, without the supplemental hand and foot survey, as currently implemented at RPP.

2.0 Scope

This document applies only to RPP facilities. This document does not provide the technical basis for determining the equivalency of an automated system to hand-held instruments, or to the effective counting capability of automated systems as such technical determinations are contained in TBTN: GDGH-9604-RLS-0015¹.

3.0 Summary and Discussion

3.1 Background

Prior to October 12, 1998, RPP required personnel to perform a whole body survey with hand-held survey instruments upon exit from a Contamination Area, with a second count by an automated counting system capable of performing a whole body survey. This practice was redundant since automated whole body survey devices are, in most cases, more sensitive and are less likely to be used incorrectly than hand-held survey instruments. Additionally, Article 221.2 of the Hanford Site Radiological Control Manual (HSRCM-1) states "Monitoring for contamination should be performed using frisking equipment that under laboratory conditions can detect total contamination of at least the values specified in Table 2-2²." Based on this criteria implementing the use of an automated whole body survey device would save significant time and reduce the crowding and potential loss of contamination control that occurs during peak times at step off pads.

Beginning October 12, 1998³, RPP implemented use of the PCM-1B for release of personnel from Contamination Areas. The current implementation of the PCM release requires a hand and foot survey at the step off pad, prior to traversing to the PCM for the release survey. This additional hand and foot survey was implemented to address concerns that contamination on top of the foot may not be detected by the PCM.

A review of contamination events since January 1996,⁴ indicated two top of shoe contamination events. In the first case, no PCM was available, but the levels were high enough that the PCM would have detected the contamination. In the second case, the contamination was detected by the PCM, but was missed by the hand-held survey. In addition, no contamination spreads have occurred as a result of personnel traversing from the step-off pad to the PCM.

¹ Bratvold 1996

² HSRCM-1

³ IOM 79740-98-019, R. J. Giordano

⁴ IOM, C. P. Selthimer

On July 1, 1999, the proposal to eliminate the supplemental hand and foot survey prior to PCM-1B release was presented to the RadCon Improvement Team.⁵ No employee representatives on the team expressed any objection to the proposal.

3.2 Summary of Determinations

Prior to implementation of the RCM-1B as the sole release survey, a series of meetings were held to resolve the issues relative to the implementation of the PCM-1B. The following determinations from those sessions are still relevant.

- 3.2.1 When available, the PCM-1B will be used in lieu of a survey with a hand-held instrument with the follow-up PCM-1B survey, when the required survey is for beta-gamma contamination.
- 3.2.2 The required instructions for donning and doffing of PPE and survey instructions for the PCM-1B and hand held instruments need to be consistent in all change trailers. Appropriate signs are currently available through stores; sign number 39403045.2 provides instruction for donning protective clothing, and sign number 39403045.1 provides instruction for removing protective clothing.
- 3.2.3 Self survey training is not required to use the PCM-1B for personnel survey, but Radiological Worker I (RWI), Radiological Worker II (RWII), or escort by a qualified radiological worker is required. RWI and RWII training review proper use of the PCM-1B as part of the training curriculum.
- 3.2.4 Survey instructions will include directions for when the PCM-1B is out of service. A means of informing workers the PCM-1B is out of service will be in place.
- 3.2.5 Portable instrument's will be maintained, at the step off pads for those periods when the PCM-1B is out of service.
- 3.2.6 No survey is required at the step off pad prior to entering the PCM-1B.
- 3.2.7 In double-wide change trailers, the area around the protective clothing (PCs) will be posted as a Radioactive Material Area as opposed to an RBA.
- 3.2.8 Change trailers where the PCM-1B will NOT be used as the sole personnel release are identified in Attachment 1.
- 3.2.9 Where installed and operational, automated survey device use is mandatory when exiting from a Contamination Area, even when a whole body survey with a portable instrument is obtained.
- 3.2.10 Implementation of the PCM-1B as a release instrument will be done only in change trailers where it can be accomplished without cross traffic between personnel entering and leaving the Contamination Area.

⁵ RCIT Agenda, July 1, 1999

3.2.11 The PCM-1B will not be used as a sole release instrument where the step off pad is not either inside the change trailer or on the change trailer access porch. An example of this is when the step off pad is located at a work area adjacent to a pit or riser inside of the CA. In these instances, a handheld instrument survey at the step off pad is required.

4.0 Assessments of Criteria, Standards and Requirements

4.1 Applicable Standards

4.1.1 Contamination surveys are required upon Contamination Area exit:

HSRCM: Article 221.1 – Personnel exiting Contamination Areas, High Contamination Areas, Airborne Radioactivity Areas or Radiological Buffer Areas established for contamination control shall frisk for contamination as required by Article 338.

HSRCM: Article 338.1 – Personnel shall perform a whole body frisk under the following conditions: immediately upon exiting Contamination Areas, High Contamination Areas and Airborne Radioactivity Areas; and as directed by the RWP or the Radiological Control Organization.

4.1.2 Contamination surveys must be performed using appropriate instruments:

HSRCM: Article 221.2 – Monitoring for contamination should be performed using frisking equipment that under laboratory conditions can detect total contamination of at least the values specified in Table 2-2. Use of automatic monitoring units that meet the above requirements is encouraged.

HSRCM: Article 338.5 – Personnel frisking shall be performed using instruments that meet the minimum detection requirements of Article 221.2. Guidelines for personnel frisking are provided in Appendix 3D.

4.1.3 Contamination surveys must be performed at the RBA boundary:

HSRCM: Article 338.2 – In addition to the above, personnel exiting a Radiological Buffer Area containing Contamination, High Contamination or Airborne Radioactivity Areas should, at a minimum, perform a hand and foot frisk. This frisk is optional if the Radiological Buffer area exit is immediately adjacent to the location where the exiting worker has already performed a whole body frisk.

4.1.4 Automated counting devices are preferred over portable instruments:

HSRCM: Article 221.2 (Second Sentence) – Use of automatic monitoring units that meet the above requirements is encouraged.

HSRCM: Article 338.6 – The use of automated personnel contamination monitors is encouraged.

4.1.5 Personnel must be trained to use the survey instruments:

HSRCM: Article 551.2 – Monitoring shall only be performed by trained and qualified personnel using instruments that are properly calibrated and routinely tested for operability.

5.0 Implementation

Prior to initial implementation of the PCM-1B as the sole release survey from RPP contamination areas, the following implementation plan was developed and implemented. It is anticipated that similar implementation protocol will be followed when the supplemental hand and foot survey is eliminated as a release survey requirement.

- 5.1 Modify step-off pad instructions in change trailers to reflect change in exit survey requirements.
- 5.2 Modify Tank Farm Orientation to reflect change in exit survey requirements.
- 5.3 Communication

This change must be clearly communicated to personnel. The primary mechanism for this will be as follows:

- Written notification in the form of a "General Information Bulletin" on the subject.
- Provide orientation at weekly Tailgate meetings.

6.0 Conclusion

Elimination of the supplemental hand and foot survey as a release survey requirement from contamination areas at RPP will not have a significant safety impact on workers or the environment because of the following:

- No contamination events have occurred that have been detected by a hand and foot survey, that would not have been detected by the PCM-1B.
- No contamination spreads have occurred by personnel traversing from the step-off pad to the PCM-1B.
- No employee concerns have been expressed regarding the proposal to eliminate the supplemental hand and foot survey.
- The Hanford site technical basis for implementation of the PCM-1B release survey does not require the supplemental hand and foot survey.

7.0 References

- Agenda, RadCon Improvement Team Meeting, July 1, 1999
- Completed Decision Making Package, TBTN: GDGH-9604-RLS-0015, T. E. Bratvold, 1996
- IOM, C. P. Seilhymer, RE: Information Request, June 18, 1999
- IOM 79740-98-019, R. J. Giordano, Closure for RCIP Internal Action Item TWRS-CO2 Action 01, October 21, 1998
- TBTN: PBGH-9607-ORP-0037, T. E. Bratvold, Best Management Practice: Additional Personnel Monitoring in Conjunction with PCM Frisk, August 1, 1996

Attachment 1: Change Trailer Utilization

RPP uses either double-wide or single wide change trailers to access most RPP facilities. Those facilities where the change trailer is used to access only Radiological Buffer Areas are not included in this assessment.

Change trailers are grouped into the following categories;

- 1) Change trailers not used to access Contamination areas
 - a) 241-T
 - b) 241-AN
 - c) 241-AW
 - d) 241-AP
 - e) 241-TX/TY
 - f) 241-BX
- 2) Change trailers used to access Contamination Areas, but where the use of the PCM-1B will not be implemented as a sole release mechanism.
 - a) 244-A Lift Station
 - b) Upper C-Farm
 - c) Lower C-Farm
 - d) 241-SY
- 3) Doublewide change trailers used to access Contamination Areas where the PCM-1B will be implemented as the sole release mechanism.
 - a) 241-BY
 - b) 241-U
 - c) 241-S
 - d) Middle C-Farm
 - e) 241-A/AY (AY-1)
- 4) Modified Singlewide trailers, using a unique step off pad arrangement used to access Contamination Areas where the PCM-1B will be implemented as the sole release mechanism.
 - a) 241-AX/AY (AY-2)

Attachment 2 – Study of Contamination Events

- 1) **Background:** A policy to utilize the PCM-1B as the sole release survey when exiting contamination areas will be implemented at TWRS facilities. Concerns have been raised about the risk of contamination of the area from the step off pad (SOP) to and including the PCM-1B.
- 2) **Purpose:** The purpose of this study is to determine if a hand and foot survey at the SOP prior to transiting to the adjacent PCM-1B is necessary.
- 3) **Data:** A review of hand and foot contamination events from June 1, 1995 though December 31, 1996 at TWRS facilities, Purex and 222-S Labs was performed. There were a total of twenty six contamination events evaluated.

Contaminated Area	How Contamination was Detected...			
	Self Survey	RCT Survey	PCM-1B	Total
Hand	2	7	5	14
Shoe	2	4	6	12
			Total	26

Two of the hand incidents were glove contamination events. One was found by self-survey and one by an auto survey device. The maximum hand contamination was 40,000 dpm and the maximum shoe contamination was 35,000 dpm. The contamination events identified by the auto-survey device were not detected by hand held instruments survey. None of the hand, foot, and glove contamination events found by auto-survey devices resulted in an uncontrolled spread of contamination between the SOP and the auto survey device. It was further determined the events discovered at the SOP with hand held instruments would not have been likely to spread contamination had they been allowed to proceed to the PCM-1B.

The Radcon Center of Expertise Completed Decision Making Package (CDMP) TBTN GDGH-9604-RLS-0015 states:

As the probability of personnel contamination is low, this CDMP does not require precursive surveys to protect the PCM-1B from becoming contaminated.

Routine monitoring of RBAs, as required in HSRCM-1, maintains contamination control.

- 4) **Recommendation:** Based on the results of the data found in this investigation and the CDMP, RPP Radiological Control determined that the relative risk of contamination spread does not warrant a hand and foot survey at the SOP prior to traversing to an adjacent PCM-1B. Therefore, recommendation is made to not use hand and foot surveys prior to leaving the SOP.