3-19-64

ADDITIONAL INFORMATION REQUESTED FOR
RFP-336

Name of Conference:

Annual Meeting of the Rocky Mountain Section
of the American Industrial Hygiene Association.

Location; Sandia Corporation - Alb. New Mexico
Sponsor: AIHA

Date of Meeting - October 17, 1963.

RFP-336

CONF-577-1

MASTER

THE DOW CHEMICAL COMPANY
ROCKY FLATS DIVISION
GOLDEN, COLORADO

U. S. Atomic Energy Commission Contract AT(29-1)-1106

SOME NEW DEVICES USED IN PLUTONIUM CONTAMINATION CONTROL

by

E. A. Putzier

August 30, 1963

LEGAL NOTICE

This report was prepared as an account of Government sponsored work. Neither the United States, nor the Commission, nor any person acting on behalf of the Commission:

A. Makes any warranty or representation, expressed or implied, with respect to the accuracy, completeness, or usefulness of the information contained in this report, or that the use of any information, apparatus, method, or process disclosed in this report may not infringe privately owned rights; or

B. Assumes any liabilities with respect to the use of, or for damages resulting from the use of any information, apparatus, method, or process disclosed in this report.

As used in the above, "person acting on behalf of the Commission" includes any employee or contractor of the Commission, or employee of such contractor, to the extent that such employee or contractor of the Commission, or employee of such contractor prepares, disseminates, or provides access to, any information pursuant to his employment or contract with the Commission, or his employment with such contractor.

Facsimile Price \$ 1.60

Microfilm Price \$.80

Available from the
Office of Technical Services
Department of Commerce
Washington 25, D. C.

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency Thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

DISCLAIMER

Portions of this document may be illegible in electronic image products. Images are produced from the best available original document.

ACKNOWLEDGEMENTS

V. P. Johnson and W. H. Tyree of the Health Physics Electronics group were primarily responsible for the design of the Alpha Flasher. The author, and J. B. Owen and his staff, of the Health Physics Operations group, were collectively responsible for the conception and design of the Downdraft Hood.

J. B. Owen and R. E. Hayne of the Health Physics Operations group were principally responsible for the design of the Glove Change Ring.

INTRODUCTION

All of us who have had experience in contamination control in plutonium operations are aware of the importance of detecting the release of contamination due to glove failures before such contamination is "tracked" from glove to glove or, in some cases, distributed over large areas. In a large operation, such as the Rocky Flats operation, reliance on health physics monitors to keep up with glove failures is impractical. Our experience is based on 8500 gloves in use with some 900 changed each month.

In addition to rapid detection of glove failures, it is important to be able to change faulty gloves rapidly with the least contamination spread from the changing operation. At the Rocky Flats Division of The Dow Chemical Company, three simple devices have been developed by Health Physics personnel to detect and control contamination release. This paper describes these three devices.

DISCUSSION

The Alpha Flasher

In any glove box operation we can expect glove failures with some frequency dependent on the nature of the work in the glove box. At our plant we average 900 glove failures per month. The first line of defense is immediate detection of these failures. The Alpha Flasher, shown in Figure 1, has brought us a long way in this direction. Because of its relatively low cost of \$70., it can be supplied in large numbers. About 260 are in service at the present time. An instrument is available for every operator to check his hands as he comes out of a glove box. Basically the success of early detection of glove failures becomes one of employee discipline. Since decontamination is done by the operator himself, it is not difficult for him to become convinced that the use of the Flasher can save him considerable undesirable work, increase his production time, and, of course, reduce the potential for airborne contamination exposure.

The Alpha Flasher is basically a transistorized air proportional counter. High voltage is obtained from a charged capacitor. Readout is from a flashing red light. Background of the instrument is from 5 to 20 flashes per minute. A source of 400 d/m will yield about 40 flashes per minute over

background. Effective probe area is about 67 cm². In a reasonably dry atmosphere, the unit will maintain sufficient charge for about 24 hours. We have had about 2 years' experience which has proven the instrument and its method of use to be effective.

The Downdraft Glove Change Hood

For contamination control during a glove change, a prototype for a Downdraft Glove Change Hood was conceived. The complete unit is shown in Figure 2. This device operates such that a flow of air passes down and over the face of the glove port and is collected at the bottom of a fabricated cardboard, throwaway hood which in turn is connected to a 1 $\frac{7}{8}$ -inch I.D. commercial vacuum cleaner hose. The throwaway hood is made from 125#-test fluted cardboard which we expect to purchase as a precut flat piece. The cardboard is folded and taped to form the hood shown in Figure 3. The vacuum cleaner pulls the air through an absolute filter. Measured air velocities in the vicinity of the glove port range from 30 ft/min. at a point above the port to 370 ft/min. at a point near the bottom of the port. These, of course, are disrupted to some extent during the operation. A detailed traverse is appended to this paper. The amount of contamination released to the air during a glove change will vary from practically nothing up to gross amounts -- sometimes predictable, but mostly not.

Therefore, it is difficult to evaluate the device on the basis of an efficiency factor. Rather, one must look at a large number of jobs and through experience compare the effect on air and surface contamination concentrations in the general vicinity of the glove change with experience under the old system. Our data to date is not large. We have used the device on about 100 glove changes. All but two changes yielded air concentrations in breathing zone areas less than the RCG. Rather than require large areas for respiratory protection based on room ventilation patterns, we expect our data to justify use of respirators only by those actually engaged in the glove change. Surface contamination is virtually eliminated. In one specific case, a glove from a normally highly contaminated glove box came completely off the port. An air sample 8 inches from the outer edge of the hood registered only 8 d/m/M³. No detectable surface contamination was found on surfaces outside the hood.

The Glove Change Ring

The Glove Change Ring has become such an effective tool that it, coupled with the downdraft unit, has brought the glove change operation almost to the point of absolute contamination control. This can best be described by showing a film of an actual change utilizing the ring.

Although a rather simple-looking device, there are three critical dimensions of the glove change ring that should be pointed out:

1. The offset position of the handle to allow one's arm easy access into the new glove;
2. The groove depth and contour around the outside of the ring for the glove bead to drop into; and
3. The I.D. of the ring which should just clear the glove port on the glove box.

The glove is first attached to the ring with the bead in the groove. If changing a right-hand glove, the offset handle should be to the left and the right hand inserted into the glove. If changing a left-hand glove, the handle should be to the right and the left hand is inserted into the glove. One needs to orient the thumb in the appropriate position. The inner and outer clamps are then removed. The new glove

is inserted into the old glove, palm up. Through the new glove one takes a firm grip on the old glove. The ring is then moved gently over the glove port and held tightly against the box. With the firm grip on the old glove, one bends his wrist toward his face using the port as a fulcrum, if necessary. As the old glove comes over the lip of the port, a firm pull downward and outward will completely loosen the old glove and it can be pushed into the box.

While maintaining pressure against the dry box, the bead of the new glove is carefully slipped off the change ring and onto the glove port. This frees the change ring. The bead is then positioned in the port groove; the rings are replaced; the area is monitored; and the operator is back in business.

SUMMARY

In summary, our experience with these devices not only has increased the ability to control contamination and personnel exposure at the glove box but obviously has shown an economic impact in increased production time with less man-hours required for decontamination efforts.

Air Velocity Traverse

$$\begin{aligned} d &= 5\frac{1}{2}'' \\ b &= 4'' \\ a &= 2'' \end{aligned}$$

$$E = 10''$$

$$D = 6''$$

$$C = 4''$$

$$B = 2''$$

$$A = 0''$$

Coordinate	Veloc., ft/min.	Coordinate	Veloc., ft/min.	Coordinate	Veloc., ft/min.
A 2a	200	B 4a	120	C 2a	70
A 2b	130	B 4b	140	C 2b	60
A 2d	80	B 4d	115	C 2d	60
A 6a	360	B 8a	115	C 6a	60
A 6b	300	B 8b	190	C 6b	100
A 6d	140	B 8d	140	C 6d	75
A10a	260	B12a	110	C10a	85
A10b	210	B12b	130	C10b	110
A10d	110	B12d	105	C10d	75
D 4a	35	E 2a	40		
D 4b	45	E 2b	30		
D 4d	45	E 2d	30		
D 8a	30	E 6a	35		
D 8b	55	E 6b	40		
D 8d	50	E 6d	35		
D12a	80	E10a	35		
D12b	85	E10b	40		
D12d	90	E10d	45		