TECHNICAL JUSTIFICATION

Technical Justification for use of the Aptec FT-126 probe with Bicron frisk-tech in Monitoring/Decon facilities.

As stated in NUREG-0654/FEMA-Rep-1, each emergency response organization should be capable of monitoring approximately 20 percent of the total resident and transient population in the plume exposure EPZ in a 12 hour period. This peak population total has been determined to be 82,944 for the Massachusetts 10 mile EPZ as determined by the Evacuation Time Estimate. Twenty percent of this amount is 16,590. Two facilities exist for monitoring evacuees within the Seabrook Plan for Massachusetts communities. Therefore, each facility should be capable of monitoring 8,295 evacuees per 12 hour shift.

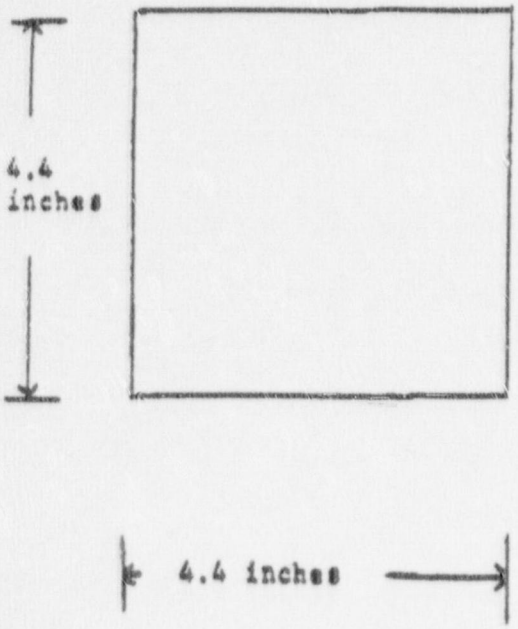
INPO Guideline 85-004 designates using "a pancake type G.M. detector and a count rate meter or an equivalently sensitive technique" to perform personnel monitoring. For monitoring/Decon purposes, a standard frisk entails movement of the probe approximately 180 linear inches, encompassing the face, head, shoulders, hands, elbows, knees and feet in a circular path about the body. A typical industry accepted G.M. detector and count rate meter is the Eberline H.P.-210 "pancake" probe with the Eberline RM-14 count rate meter. The average efficiency of the H.P.-210 probe is approximately 13%, and the diameter of the circular probe is 1.75 inches.

The Eberline RM-14 count rate meter has a two position response switch. When switched to fast position, the response time is 2 seconds. When switched to slow position, the response time is 20 seconds, measured to 90% of the final reading.

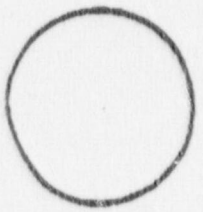
The Seabrook Plan for Massachusetts Communities utilizes the Aptec FT-126 G.M. probe with the Bicron frisk-tech count rate meter for personnel and equipment monitoring. The Aptec is a square G.M. probe 4.4 inches per side. The average efficiency of the Aptec FT-126 probe is approximately 11.6% as determined by New Hampshire Yankee laboratory testing. The Bicron frisk-tech count rate meter is equipped with a continuously adjustable response time from 2 to 20 seconds.

In comparing efficiencies and sensitivities between the H.P.-210/RM-14 and the Aptec FT-126/Bicron frisk-tech, the specifications are comparatively identical for all practical purposes. The major functional differences are probe size and response time. The linear distance across the effective area of the Aptec probe is 2.5 times the linear distance across the Eberline probe.

Aptec FT-126



Eberline H.P. 210



4.4 in. 1.75 in. = 2.5

Both the Aptec and the Eberline probes would be effective in recognizing the existance of contamination over a large surface, independent of rate of travel. However, identifying contamination while passing the probe over a relatively small area of deposition is dependent upon effective probe area, rate of travel and response time of the count rate meter. With effective time being defined as total probe time over a specific point at a specific rate of travel and given a rate of travel of 2 inches per second, the Eberline H.P. 210 probe will have an effective time of .875 seconds. The effective time of the Aptec FT-126 probe at a rate of travel of 2 inches per second is 2.2 seconds. Therefore, the Aptec probe has an effective time two and one half times that of the Eberline probe.

	LINEAR DISTANCE ACROSS PROBE	RATE OF TRAVEL	EFFECTIVE TIME
Aptec FT-126	4.4 inches	x 1 sec/2 inches =	2.2 sec.
Eberline H.P. 210	1.75 inches	x 1 sec/2 inches =	.875 sec.

The Eberline RM-14 count rate meter response is set on slow for frisking purposes. Fast response (2 seconds) is unacceptable due to spurious alarming. No intermediate setting exists on the RM-14. The Bicron frisk-tech is continuously adjustable from 1 to 20 seconds. For frisking pusposes the Bicron response time is set to approximately 5 seconds. Therefore, the Bicron frisk-tech responds four times faster than the RM-14.

When judged against the Eberline H.P, 210/RM14 combination, the Aptec FT-126/Bicron exhibits an effective time more than twice that of the Eberline, and a response time four times faster; thus the Aptec could be moved at 5 inches per second and maintain an effective time equal to that of the Eberline H.P. 210. Since the Bicron responds in one fourth the time of the Eberline RM-14, there is no compromise in response time. Moving the Aptec probe at 3 inches per second maintains an effective time 1.67 times that of the Eberline probe.

	LINEAR DISTANCE ACROSS PROBE	RATE OF TRAVEL		EFFECTIVE TIME
Eberline H.P. 210	1.75 inches	x 1 sec/2 inches	=	.875 seconds
Aptec FT-126	4.4 inches	x 1 sec/ 5 inches	=	.88 seconds
Aptec FT-126	4.4 inches	x 1 sec/ 2 inches	=	2.2 seconds
Aptec FT-126	4.4 inches	x 1 sec/ 3 inches	=	1.47 seconds

Use of the Aptec FT-126 probe in conjunction with the Bicron frisk-tech count rate meter for a 60 second frisk (3 inches per second) compromises no FEMA standards. Efficiency, sensitivity and response are well within acceptable guidelines.

Using these criteria, each facility within the Seabrook Plan for Massachusetts Communities can effectively process 8,568 evacuees per 12 hour shift.

60 sec. frisk + 5 seconds in + 5 seconds out = 70 seconds

70 seconds per frisk = 51 frisks per hour

51 frisks per hour x 14 stations x 12 hours = 8,568 evacuees/facilities per 12 hours.