PROTECTION FACTOR TEST RESULTS

ILC DOVER CHEMTURION MODEL 3525

December 18,2002

SUMMARY

The ILC Dover Model 3525 Chemturion Chemical Suit was tested in accordance with the NFPA 1991 Standard on Vapor-Protective Ensembles for Hazardous Materials Emergencies, 2000 edition, section 6-8 Overall Ensemble Inward Leakage Test. The model tested was 3525-10001 in sizes large and x-large. This suit configuration includes Bata Hazmat boots, OEB pressure sealing zipper, 4 exhaust vents, Ansell Edmont Scorpio gloves and a Scott Passthru airline connection. For all tests air was supplied to the suit at a rate of 9 cubic feet per minute (cfm).

CHALLENGE

- Test preformed in accordance with NFPA Standard 1991, 2001 edition section 6-8 Overall Ensemble Inward Leakage Test.
- Preformed in a closed 12' X 12' X 8' room.
- Air bottles inside the test chamber delivered air into the suit at a rate of 9 cfm.
- Chemically pure SF_6 was released.
- Four sample bags and a pump were placed in the center of the room, and were also placed in the suit at four different locations.

TEST SPECIFICATIONS

Test agent:	sulfur hexafluoride (SF_6) released into test chamber
Total samples per test subject:	8
Baseline samples (No SF_6):	1 on inside center of suit back and 1 outside in center of test chamber, taken in conjunction
In suit samples (with SF_6):	1 in center of closure, 1 near left back exhaust, 1 in breathing zone near bottom of visor
Outside suit (with SF_6):	3 in center of test chamber taken in conjunction with each of the in suit samples
Sampling time:	8 ± .5 minutes for each sample bag
Sample pump flow rate:	0.1 L/min ± 0.005 L/min

EXERCISE

Exercise	Repetitions
Kneel on left knee, kneel on both knees, kneel on right knee, stand	4
Duck squat, pivot right, pivot left, gather suit, stand, extend arms above head	4
Stand, bend body left, bend body forward, bend body right, stand	4
Stand, extend arms overhead laterally, bend elbows, return	4
Stand, extend arms overhead in frontal direction, bend elbows, return	4
Stand, extend arms perpendicular to sides, twist left, return, twist right, return	4
Stand, reach arms across chest to opposite sides, return	4
Walk in place 3 minutes	-
Crawl on hands and knees in place for 1 minute	-
Lift 12" cinder block, carry across test chamber (12'), set down	5
With right hand, scoop marbles from right container across body to left container	5
With left hand, scoop marbles from left container across body to right container	5

RESULTS

Subject 1

Suit P/N: 3525-10001-02-04 S/N: 108365210 Size: Large

	PPM of SF_6			
Location	In suit	In Test Chamber	% Inward Leakage	PF
Baseline (Back of suit)	< .06	13	-	-
Breathing Zone	< .06	970	< 0.006	> 16000
Suit Closure	< .06	890	< 0.007	> 15000
Exhaust Valve	< .06	820	< 0.007	> 13000
		requirement:	0.02	5000

Subject 2

Suit P/N: 3525-10001-02-04 S/N: 109055212 Size: Large

	PPM of SF_6			
Location	In suit	In Test Chamber	% Inward Leakage	PF
Baseline (Back of suit)	< .06	0.5	-	-
Breathing Zone	< .06	1080	< 0.006	> 18000
Suit Closure	< .06	1030	< 0.006	> 17000
Exhaust Valve	< .06	1020	< 0.006	> 17000
		requirement:	0.02	5000

Subject 3:

Suit P/N: 3525-10001-02-04 S/N: 109055212 Size: Large

	PPM of SF_6			
Location	In suit	In Test Chamber	% Inward Leakage	PF
Baseline (Back of suit)	< .06	1.8	-	-
Breathing Zone	< .06	1120	< 0.005	> 19000
Suit Closure	< .06	1050	< 0.006	> 17000
Exhaust Valve	< .06	1010	< 0.006	> 17000
		requirement:	0.02	5000

Subject 4

Suit P/N: 3525-10001-03-05 S/N: 109065212 Size: X-Large

	PPM of SF_6			
Location	In suit	In Test Chamber	% Inward Leakage	PF
Baseline (Back of suit)	< .06	14	-	-
Breathing Zone	< .06	900	< 0.007	> 15000
Suit Closure	< .06	1080	< 0.006	> 18000
Exhaust Valve	< .06	930	< 0.007	> 15000
		requirement:	0.02	5000

Subject 5

Suit P/N: 3525-10001-03-05 S/N: 109065212 Size: X-Large

	PPM of SF_6			
Location	In suit	In Test Chamber	% Inward Leakage	PF
Baseline (Back of suit)	< .06	0.27	-	-
Breathing Zone	< .06	940	< 0.006	> 16000
Suit Closure	< .06	760	< 0.008	> 13000
Exhaust Valve	< .06	650	< 0.009	> 11000
		requirement:	0.02	5000

Subject 6

Suit P/N: 3525-10001-03-05 S/N: 109075214 Size: X-Large

	PPM of SF_6			
Location	In suit	In Test Chamber	% Inward Leakage	PF
Baseline (Back of suit)	< .06	0.6	-	-
Breathing Zone	< .06	890	< 0.007	> 15000
Suit Closure	< .06	710	< 0.008	> 12000
Exhaust Valve	< .06	690	< 0.009	> 12000
		requirement:	0.02	5000

The results show that the Model 3525 exceeds the industry standards for inward leakage and protection factor. The minimum detection of the equipment used was .06 ppm SF6. This result is expected due to the fact that Model 3525 is a positive pressure suit. The pressure differential is great enough that material should only ever flow out of the suit.