

Attachment B

**Evaluation of an Immersive “VRMine” Mine Rescue Team Contest Simulation Exercise:
Exploration Team Survey**

Team ID _____

Have you ever experienced a virtual reality (VR) environment before today? No Yes

Have you ever experienced VR using a head-mounted display (HMD) before today? No Yes

Have you ever participated in multi-player VR activities using HMD? No Yes

How often do you use an HMD?

Daily Weekly Monthly A few times a year Never

Have you ever trained for mine rescue in a VR environment before today? No Yes

Have you ever trained for mine rescue using VR HMD before today? No Yes

Team ID _____

Think about the simulation you just completed and place an “X” in the appropriate box.

a) How natural did moving through the virtual mine seem?										
Not Natural										Very Natural
b) How much did your experience in the virtual simulation seem consistent with your real-world experiences in an actual mine?										
Not Consistent										Very Consistent
c) How natural were your interactions with the environment (e.g., sounding roof, taking gas readings)?										
Not Natural										Very Natural
d) Did you lose track of time during the exercise?										
Did not lose track of time at all										Completely lost track of time
e) How responsive was the simulation to actions that you performed with the controllers?										
Not at all responsive										Very responsive
f) How engaged were you in the virtual reality experience?										
Not at all engaged										Very engaged
g) How immersed did you feel in the virtual environment?										
Not at all immersed										Very immersed
h) How realistic did the simulated underground mine seem?										
Not at all realistic										Very realistic

On a scale from 1 to 10, rate how difficult or easy it was for you, by the end of the simulation, to do the following

Place an “X” in the appropriate box.	N/A	Very Hard								Very Easy	
		1	2	3	4	5	6	7	8	9	10
a) Use a tool with the controller (e.g., sounding stick, gas meter)		1	2	3	4	5	6	7	8	9	10
b) Switch to a different tool on your belt		1	2	3	4	5	6	7	8	9	10
c) Pick up an object		1	2	3	4	5	6	7	8	9	10
d) Carry an object		1	2	3	4	5	6	7	8	9	10
e) Hand off an object to a teammate		1	2	3	4	5	6	7	8	9	10

Team ID _____

From strongly disagree to strongly agree, please answer the following about today's VR simulation system (including your communications and interactions with one another and the briefing officer).

Place an "X" in the appropriate box.	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
a) I think that I would like to use this kind of VR simulation system more frequently.					
b) I found the simulation system to be unnecessarily complex.					
c) I thought the simulation system was easy to use.					
d) I think that I would need the support of a technical person to be able to use this kind of simulation system.					
e) I found the various functions in this simulation system were well integrated.					
f) I thought there was too much inconsistency in this simulation system.					
g) I would imagine that most people would learn to use this system very quickly.					
h) I found this simulation system very awkward to use.					
i) I felt very confident using this simulation system.					
j) I needed to learn a lot of things before I could get going with this simulation system.					
k) Training in a virtual environment like this is a good <i>substitute</i> for training in other simulated environments (e.g., fields, physical structures).					
l) Training in a virtual environment is a good <i>supplement</i> to training in other simulated environments (e.g., fields, physical structures).					

Rate how much, if at all, you experienced the symptoms below as a result of the VR simulation.

	None	Slight	Moderate	Severe
a) General discomfort				
b) Eyestrain				
c) Difficulty focusing				
d) Nausea				
e) Dizziness				
f) Stomach awareness (e.g., fluttering, "butterflies")				

Rate how much, if any, motion sickness did you experience during the following events in the VR simulation?

	None	Slight	Moderate	Severe
a) Moving down a long entry in the mine				
b) Periods of stopping and moving suddenly				
c) Turning around quickly				
d) Looking around the mine while moving				
e) Looking into a refuge chamber				
f) During teleportation				

Open-ended questions

Team ID _____

Likes/Dislikes

Did you enjoy participating in today's simulation exercise No Yes

If anything, what did you enjoy most about today's simulation exercise?

What did you like least about today's simulation exercise?

VR Mine specifics

What was the greatest difficulty you had using this technology today?

What VR features or capabilities would you like to see in future simulations that you did not see in this one (e.g., link line, first aid)

What changes can we make to improve VR simulations for the purposes of mine rescue training?

VR training fit

If at all, how would you most like to see this type of simulation used in training?

What, if any, gaps in mine rescue training do you think VR simulations like this could help to fill?

How would you see a VR simulation being used to address these gaps?

Given the opportunity would you be interested in participating in virtual mine rescue contests instead of traveling to a physical location to participate?

Given the opportunity, would you be interested in participating in virtual mine rescue contests in addition to traveling to a physical location to participate in existing mine rescue competitions?

Wrap up

Any other comments (positive or negative) or suggestions regarding the simulation you just participated in?