

# Work Plan Outline

## **Task Group 3: *Vulnerability Assessment of a Terrorist Attack on a Generic Nuclear Waste Transport***

Objective: Determination of the impact of an armed attack on the transport of spent fuel. Scenarios should be discussed both for rural and urban locations.

Preamble: Discussion on the inherent vulnerabilities of transporting nuclear materials and the differences between fixed sites and in-transit materials. This discussion will reference the worldwide problem of defining the transportation threat including regulations from IAEA, NRC, MinAtom, etc..

3.1 Discussion of a generic spent fuel transportation program, including time needed to move materials, frequencies of movement, locations (reprocessing and/or geologic repository), etc.

3.1.1 Spent fuel casks – truck based system description.

3.1.1.1 Reference type of cask and its cargo load.

3.1.1.2 Reference vehicle details including fuel capacity, floor thickness, etc.

3.1.2 Spent fuel casks – rail – train based system description.

3.1.2.1 Reference type of cask to be used and its capacity/payload.

3.1.2.2 Reference train details including number of engines, security arrangements, etc..

3.2 Source terms discussion as related to cargo, capacity, and radioactivity level.

3.2.1 Function of cargo load, radioactive level, and release fraction – generation of a mathematical function to communicate these relationships and then create a chart for various configurations.

3.3 Vulnerability per attack scenario. Each of the scenarios below will be assessed as to the weapon's ability to penetrate the outer skin of the cask and then to create an opening in the reference casks. Additionally calculations will be made on the release fraction (%) of the actual load of radioactive material that could reasonably be expected to be released into the environment.

### Threat Scenarios

1. RPG attack on a rail cask.
2. RPG attack on a truck cask.
3. Concealed weapon attack (shape charge or other) on rail cask shipment.

4. Concealed weapon attack (shape charge or other) on truck cask shipment.
5. Collapse attack on rail shipment.
6. Collapse attack on truck shipment.
7. Transportation infrastructure attack against rail shipment.
8. Transportation infrastructure attacks against truck shipment.
9. Anti-tank weapons used against rail cask.
10. Anti-tank weapon used against truck cask.
11. Hijack of train with waste cask on board.
12. Hijack of truck with waste cask cargo.
13. Direct attack using truck bomb (massive shape charge) on train.
14. Direct attack using truck bomb (massive shape charge) on truck.

Mitigating factors.

1. Active insiders.
2. Presence of large group of attackers (12 to 15).
3. Suicide attackers.
4. Financing.
5. Small arms.
6. Military training.
7. Explosives access or technical expertise to make them (ANFO).

<b>MODEL OF ATTACK ANALYSIS GRID</b>														
<b>DESCRIPTION OF THE ATTACK MODE</b>	<b>WEAPONS AND NUMBER OF ATTACKERS</b>	<b>COUNTER MEASURES</b>	<b>LOCATION</b>											
			<b>URBAN</b>	<b>RURAL</b>										
<p>In this column the type of attack will be listed and relevant identifiers used. This project assumes 14 types of attacks.</p>	<p>The possible weapons that could be used during an attack are listed in this column. To shorten the description the description will begin with what we term the “standard package” of potential weapons and attackers: including specific number of attackers (4), general weapons one could expect them to have (small arms like handguns and AK 47). In addition specific weapons that are the main focus of the tactic will be noted herein. For example in this mode we could use RPG 27 as one example, or other Western made reference weapon.</p> <p>Each tactic will also include discussion on availability of weapons.</p>	<p>Disguise devices for cargos, security forces including training, training for transit workers, communications, etc. This discussion will be incorporated into the DBT counter measures suggested below.</p> <p>Each scenario will have a detailed discussion relevant to that particular tactic and its unique characteristics.</p>	<table style="width: 100%; border: none;"> <tr> <td style="text-align: center;"><b>ND</b></td> <td style="text-align: center;"><b>ND</b></td> </tr> <tr> <td style="text-align: center;"><b>DNR</b></td> <td style="text-align: center;"><b>DNR</b></td> </tr> <tr> <td style="text-align: center;">DSR</td> <td style="text-align: center;">DSR</td> </tr> <tr> <td style="text-align: center;">DMR</td> <td style="text-align: center;">DMR</td> </tr> <tr> <td style="text-align: center;">DSIR</td> <td style="text-align: center;">DSIR</td> </tr> </table> <p>Here each level of possible damage will be assessed up to the highest level of consequence. These will be based on expert opinion, release calculations, and other factors. In the above example the level we could calculate would be communicated as no damage (most likely outcome) and if under the right circumstances the outcome would be DNR or damage with no release. The three other possibilities are unrealistic considering weapons, casks designs, and calculations used in this report.</p>	<b>ND</b>	<b>ND</b>	<b>DNR</b>	<b>DNR</b>	DSR	DSR	DMR	DMR	DSIR	DSIR	<p>ND = no damage  DNR = damage but no release  DSR = damage with slight release  DMR = damage with moderate release  DSIR = damage with significant release</p>
<b>ND</b>	<b>ND</b>													
<b>DNR</b>	<b>DNR</b>													
DSR	DSR													
DMR	DMR													
DSIR	DSIR													

DESCRIPTION OF THE ATTACK MODE	WEAPONS AND NUMBER OF ATTACKERS	COUNTER MEASURES	LOCATION	
			URBAN	RURAL
1. RPG based attack on a rail based cargo.	Standard package as described by our expert team including specific number of attackers (12 to 15), weapons (small arms like handguns and several AK 47's). RPG weapons (RPG 29 is example) .  These weapons are widely available on the black markers of the world and access to them is not difficult.	Disguise devices for cargos, security forces including policy training, training for transit workers, communications, etc.	<b>ND</b> <b>DNR</b>  DSR DMR DSIR  In this example, the threat would be minimal as determined by the potential for release, the fraction of release, and its impact on the environment.	<b>ND</b> <b>DNR</b>  DSR DMR DSIR  Each mode of attack will then be separated into rural and urban effect. It is possible the risk level is greater for one or the other, but this will need to be determined.

DESCRIPTION OF THE ATTACK MODE	WEAPONS AND NUMBER OF ATTACKERS	COUNTER MEASURES	LOCATION	
			URBAN	RURAL
2. RPG attack on truck.			ND DNR DSR DMR DSIR	ND DNR DSR DMR DSIR

DESCRIPTION OF THE ATTACK MODE	WEAPONS AND NUMBER OF ATTACKERS	COUNTER MEASURES	LOCATION	
			URBAN	URBAN
3. Concealed weapons attack on rail cask.. Here the concealed weapons are hidden within the railway structures adjacent to the train. For example, in the side of the mountain next to the train or the walls of tunnel.			ND DNR DSR DMR DSIR	ND DNR DSR DMR DSIR

DESCRIPTION OF THE ATTACK MODE	WEAPONS AND NUMBER OF ATTACKERS	COUNTER MEASURES	LOCATION	
			URBAN	URBAN
4. Concealed weapons attack on truck cask.			ND DNR DSR DMR DSIR	ND DNR DSR DMR DSIR

DESCRIPTION OF THE ATTACK MODE	WEAPONS AND NUMBER OF ATTACKERS	COUNTER MEASURES	LOCATION	
			URBAN	URBAN
5. Collapse attack on rail shipment. Here the attack would create a collapse of the surrounding area (tunnel, landslide, or whatever) that would impact the cargo and may cause release..			ND DNR DSR DMR DSIR	ND DNR DSR DMR DSIR

DESCRIPTION OF THE ATTACK MODE	WEAPONS AND NUMBER OF ATTACKERS	COUNTER MEASURES	LOCATION	
			URBAN	URBAN
6. Collapse attack on truck shipment.			ND DNR DSR DMR DSIR	ND DNR DSR DMR DSIR

DESCRIPTION OF THE ATTACK MODE	WEAPONS AND NUMBER OF ATTACKERS	COUNTER MEASURES	LOCATION	
			URBAN	URBAN
7. Transportation infrastructure attack against rail casks and train. Using explosives, the attackers would attack the actual infrastructure on which the train moves (including co-existent factors such as pipelines and/or other train cargoes.)			ND DNR DSR DMR DSIR	ND DNR DSR DMR DSIR

DESCRIPTION OF THE ATTACK MODE	WEAPONS AND NUMBER OF ATTACKERS	COUNTER MEASURES	LOCATION	
			URBAN	URBAN
8. Transportation infrastructure attack against truck cask and vehicle.			ND DNR DSR DMR DSIR	ND DNR DSR DMR DSIR

DESCRIPTION OF THE ATTACK MODE	WEAPONS AND NUMBER OF ATTACKERS	COUNTER MEASURES	LOCATION	
			URBAN	URBAN
9. Anti-tank weapon used against a rail shipment.			ND DNR DSR DMR DSIR	ND DNR DSR DMR DSIR

DESCRIPTION OF THE ATTACK MODE	WEAPONS AND NUMBER OF ATTACKERS	COUNTER MEASURES	LOCATION	
			URBAN	URBAN
10. Anti-tank weapon used against a truck shipment.			ND DNR DSR DMR DSIR	ND DNR DSR DMR DSIR

DESCRIPTION OF THE ATTACK MODE	WEAPONS AND NUMBER OF ATTACKERS	COUNTER MEASURES	LOCATION	
			URBAN	URBAN
11. Hijack of train with the intent of crashing it into some feature that would cause release.			ND DNR DSR DMR DSIR	ND DNR DSR DMR DSIR

DESCRIPTION OF THE ATTACK MODE	WEAPONS AND NUMBER OF ATTACKERS	COUNTER MEASURES	LOCATION	
			URBAN	URBAN
12. Hijack of truck. with the intent of crashing it into some feature that would cause release.			ND DNR DSR DMR DSIR	ND DNR DSR DMR DSIR

DESCRIPTION OF THE ATTACK MODE	WEAPONS AND NUMBER OF ATTACKERS	COUNTER MEASURES	LOCATION	
			URBAN	URBAN
13. Direct attack using truck on rail shipment. Using another vehicle to attack train and coupled with explosives.			ND DNR DSR DMR DSIR	ND DNR DSR DMR DSIR

DESCRIPTION OF THE ATTACK MODE	WEAPONS AND NUMBER OF ATTACKERS	COUNTER MEASURES	LOCATION	
			URBAN	URBAN
14. Direct attack using truck on truck.			ND DNR DSR DMR DSIR	ND DNR DSR DMR DSIR

3.4 Rankings of spent fuel casks and their vulnerabilities. After completion of the above analysis a ranking of these tactics as to their potential to create the most significant, moderate, and small releases will be accomplished.

3.5 Typology of consequences and details on how these are defined for this report. For example a small release would be specified for both a rail cargo and a truck cargo. These may also be geographically specific – that determination will be made after analysis is complete and reviewed.

Table 3

NAME	DESCRIPTION	VALUE IN ANALYSIS
ND	No release and no significant damage after an attack.	As baseline and for analysis of short term psychological, economic, and social consequences.
DNR	Damage to the cask and/or shipment vehicle but with no release of cargo.	For analysis of short term psychological, economic, and social consequences.
DSR	Damage to the shipment cask with release of a small amount of the radioactive cargo.	As minimum worst case scenario.
DMR	Damage to the shipment cask with release of a moderate amount of the radioactive cargo.	As a moderate worst case scenario.
DSIR	Damage to the shipment cask with release of a significant amount of the radioactive cargo.	As maximum worst case scenario.

3.6 Discussion of the other factors that may change these attack scenarios (active insider, more attackers, etc.)

3.7 DBT for generic transport system will be provided. Included could be suggestions for rail and truck specifications, frequencies, security suggestions and the like.

3.7.1 DBT for rail transport. Items may include a profile of the motivation of attackers, security levels, response times, training for first responders, etc.

3.7.2 DBT for generic truck transport system. Including the same items and others that apply to truck transport alone – for example refueling.

### 3.8 Suggestions for research and development.

3.8.1 For items directly related to transport effort – protection devices, disguise methodologies, etc..

3.8.2 For technologies in communications and monitoring of cargoes.