Training techniques of the European Qualification Framework

Well-Designed Training Pathways

Milano, 03/07/2025

Funz. Tec. **Silvio MAZZELLA**
Instructor Radioprotection and Nuclear Defence

AGENDA

Training program

Active-learning : Flipped Classroom

CBRN-Analysis

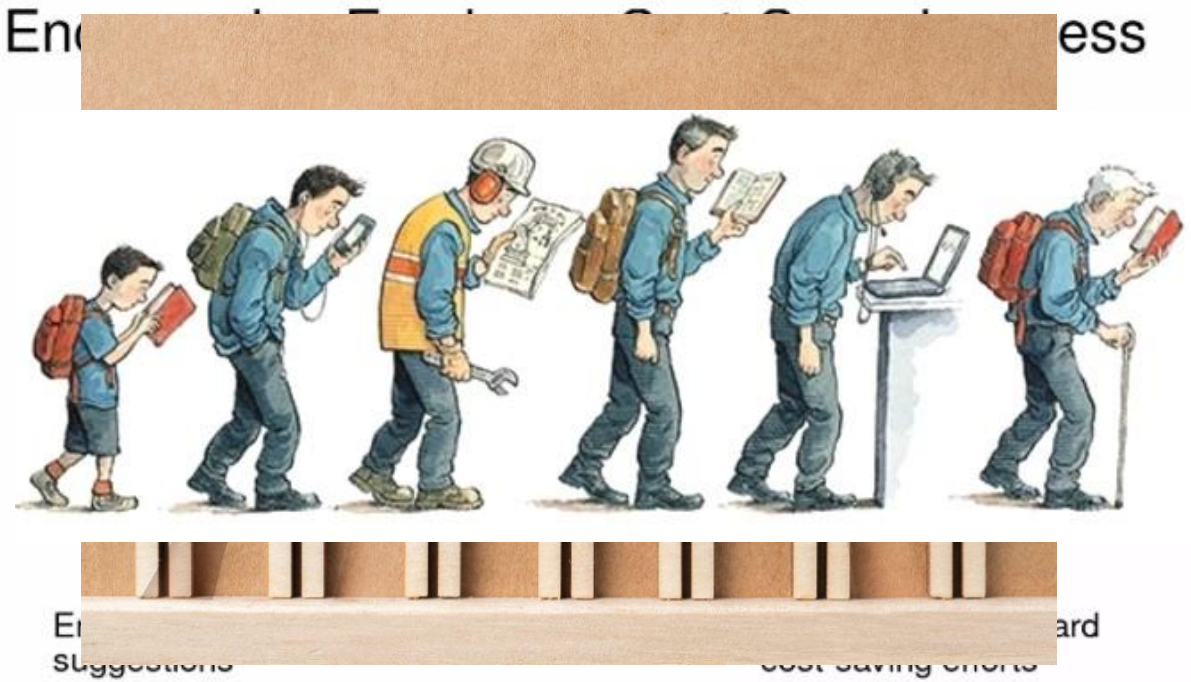
HPAC

Summary

A well-structured training program

- **A natural propensity for initiative (individual vocations).**
- **Continuous improvement and updating (in keeping with "lifelong learning" principles).**

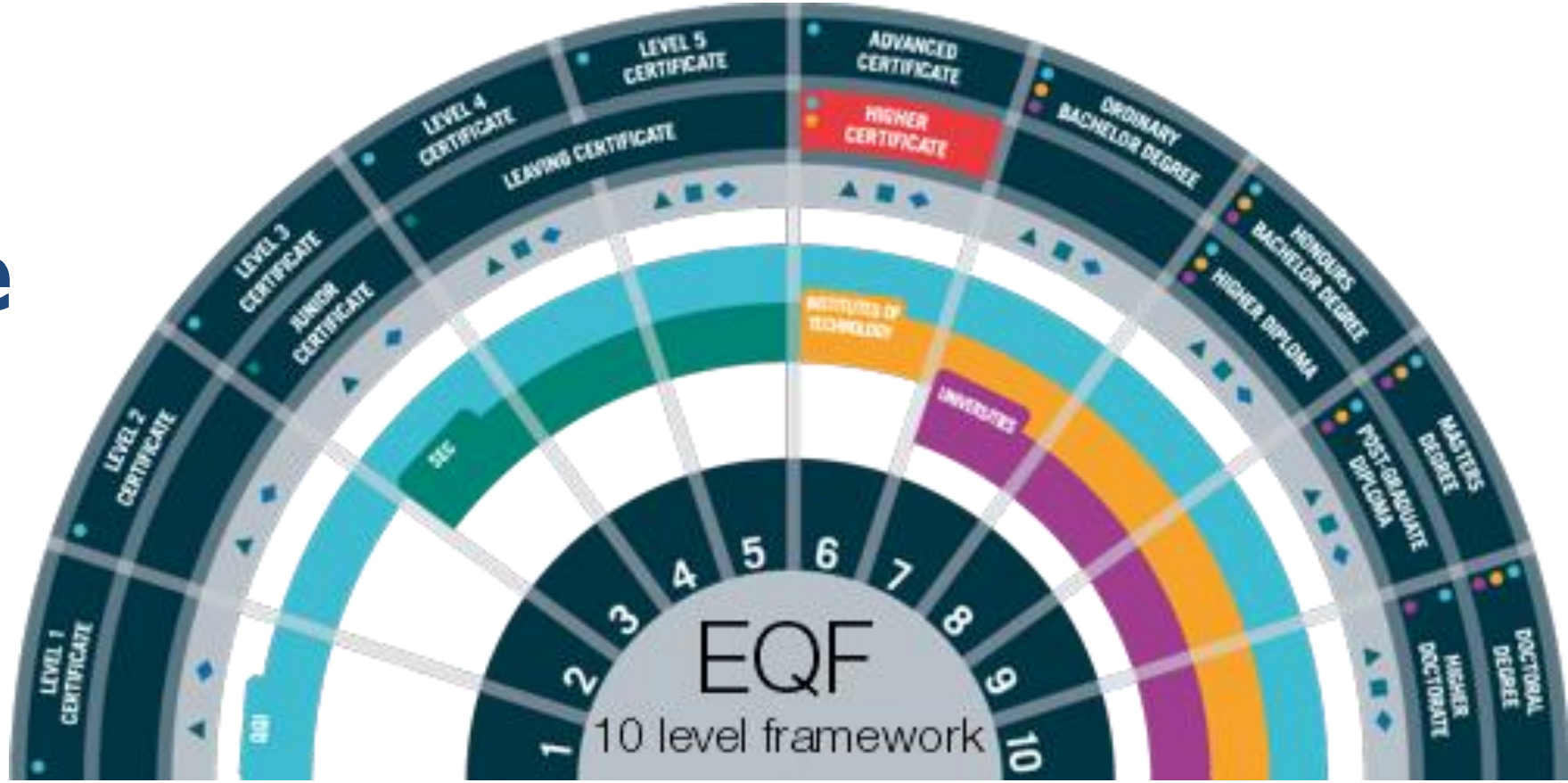
  Exams never end (Eduardo De Filippo)
- **Conscious participation in achieving professional objectives.**



Training program

Training Impacts Three Key Learning Dimensions:

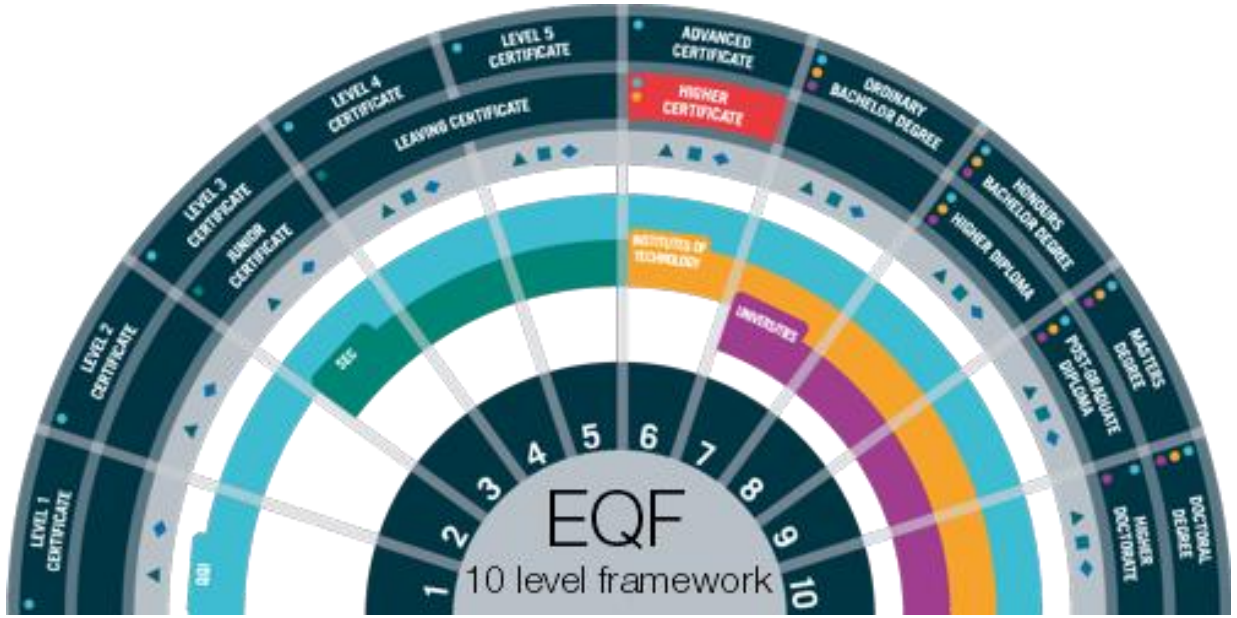
- **Knowledge**



EUROPEAN QUALIFICATION FRAMEWORK (EQF)

Represents the assimilation of information through learning - comprising facts, principles, theories and practices relevant to a specific work sector.

Training Impacts Three Key Learning Dimensions:



EUROPEAN QUALIFICATION FRAMEWORK (EQF)
Represents the assimilation of information through learning - comprising facts, principles, theories and practices relevant to a specific work sector.

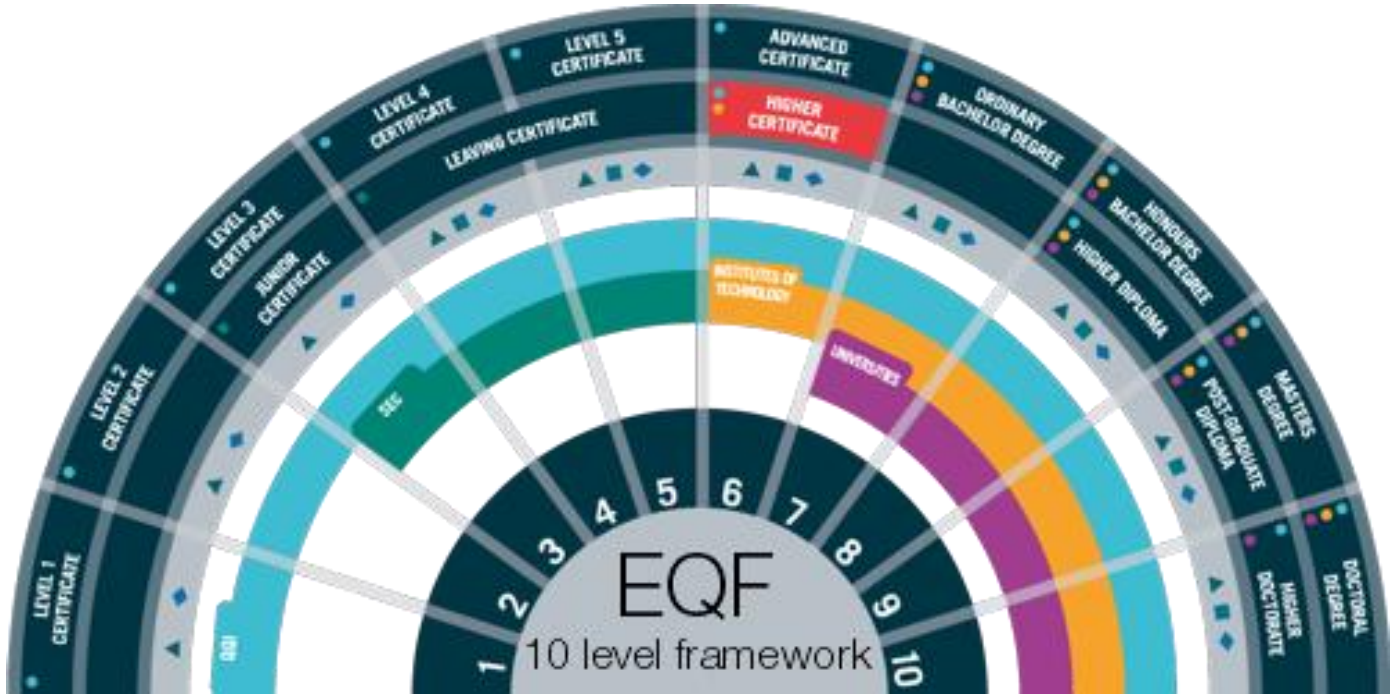
Knowledge

The European Qualifications Framework (EQF) is a classification system that allows you to compare qualifications and degrees from different countries, developed by the European Union.
The EQF is structured into eight levels of learning and skills.
Level 1 indicates basic skills, level 8 corresponds to advanced university-level qualifications.

Training program

Training <u>Impacts</u> Three Key Learning Dimensions:

- **Knowledge**
- **Skills**



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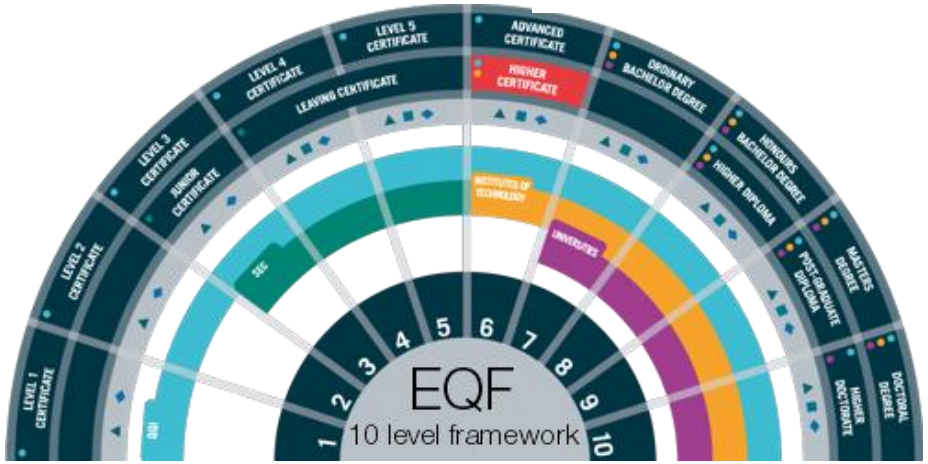


EUROPEAN QUALIFICATION FRAMEWORK (EQF)

Represents the assimilation of information through learning - comprising facts, principles, theories and practices relevant to a specific work sector.

LEVEL	SKILL
1	CONCENTRATION AND ITERATION
2	MEMORY AND PARTICIPATION
3	COGNITION, COLLABORATION AND RESULT ORIENTATION
4	PROBLEM SOLVING, COOPERAZIONE E MULTITASKING
5	ANALYSIS AND EVALUATION, EFFECTIVE COMMUNICATION, CRITICAL ISSUE MANAGEMENT
6	SYNTHETIC VISION, ABILITY TO NEGOTIATE AND MOTIVATE AND PLANNING
7	SYSTEMIC VISION, LEADERSHIP, MANAGEMENT OF RELATIONAL NETWORKS AND COMPLEX SOCIAL INTERACTIONS AND PLANNING
8	STRATEGIC VISION, CREATIVITY AND ABILITY TO PROJECT AND EVOLUTION

Source: ANPAL 2020:79
Associazione Nazionale Politiche Attive del Lavoro
Ministero del Lavoro e delle Politiche Sociali

Training program

Training Impacts Three Key Learning Dimensions:

- **Knowledge**
- **Skills**
- **Attitudes**

ATTITUDES reflect the personal dimension of competence, encompassing character qualities (determination, self-awareness, responsibility, etc.) and internal processes (motivation, contextual sensitivity, reliability, positivity, etc.) that contribute to organizational goals

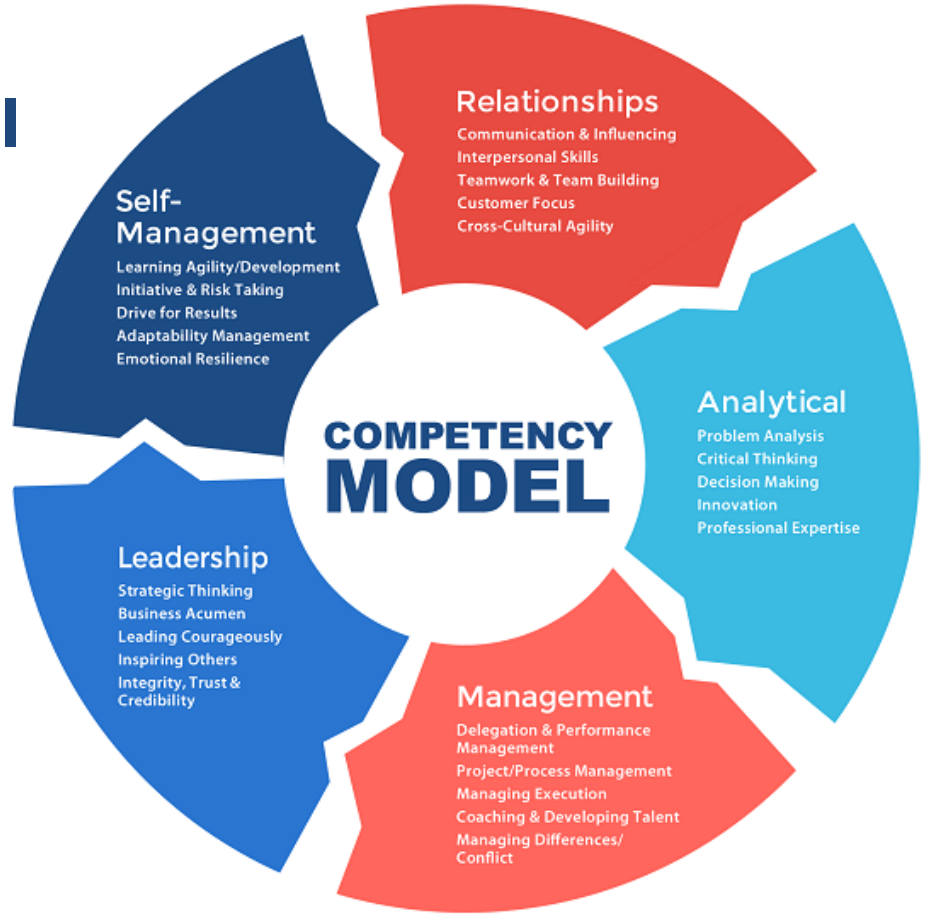
comprising facts, principles, theories and practices relevant to a specific work sector.

A Well-structured training program

Instructional Design Requirements

Training programs and teaching systems **must be designed to**:

- **Support competency model development**



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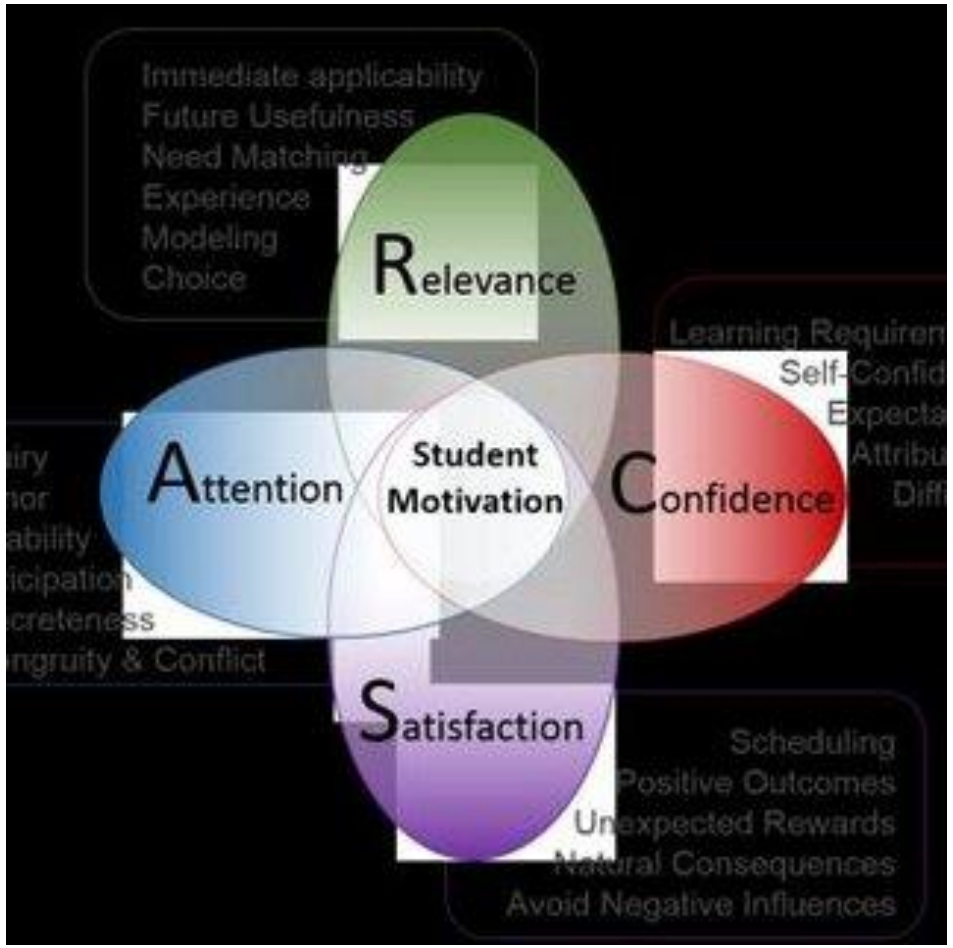

- **Support competency model development**
- **Enable trainees to learn meaningfully, autonomously, and responsibly**

Instructional Design Requirements

Training programs and teaching systems **must be designed to**:

- **Support competency model development**
- **Enable trainees to learn meaningfully, autonomously, and responsibly**
- **Create "learning environments"**

- Research and investigation
- Problem identification and resolution
- Collaborative situation management
- Self-reflection and action evaluation

Training should therefore encompass not just theoretical study, but also experimental and experiential learning.

AGENDA

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Active-learning : Flipped Classroom

CBRN-Analisys

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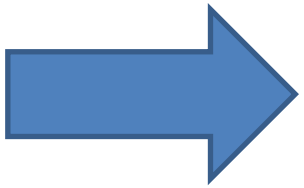
Teaching Methodology

Across all disciplines, teaching methods **must ensure effective learning processes** where personnel:

Assimilate

- **Information**
- **Ideas**
- **Values**



Acquire

- **Knowledge**
  (theoretical understanding)
- **Know-how**
  (applied knowledge)
- **Skills and competencies**
  (practical abilities)

Malcolm Knowles' - Andragogy, Adult Learning Theory

Assumptions Of Adult Learners

ANDRAGOGY THEORY (M. KNOWLES)	PEDAGOGY	ANDRAGOGY
1. NEED TO KNOW	Children learn without needing to apply knowledge to real life.	Adults need to understand why they must learn a topic.
2. SELF-CONCEPT	Children depend on teachers.	Adults perceive themselves as autonomous learners.
3. ROLE OF EXPERIENCE	Children undervalue experience.	Experience shapes adult learning.
4. READINESS TO LEARN	Children learn indiscriminately.	Adults learn what they need to address real-life situations.
5. LEARNING ORIENTATION	Subject-centered.	Problem-centered and pragmatic.
6. MOTIVATION	External (grades, approval).	Internal (desire, self-esteem).

Teaching Strategies

Expository

Heuristic

Active-learning : Flipped Classroom

An evolving active-learning methodology comprising more phases:

Self-paced learning using ***multimedia tools***.

AGENDA

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LIFE SAVING SOFTWARE SOLUTIONS

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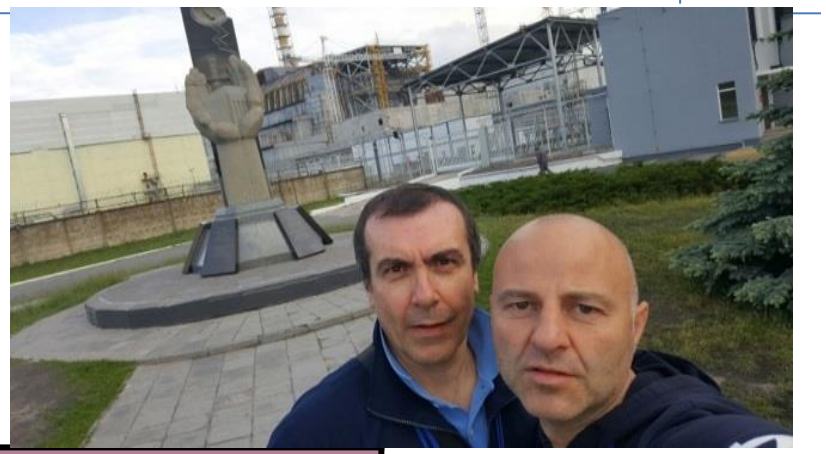
support@bruhn-newtech.com

CBRN Analisys

High-emission events of Radionuclides in the atmosphere (From Choppin, Rydberg and Liljenzin)



Hiroshima & Nagasaki	Japan	1945	4×10^{16}	Fission Products Actinides
Atmospheric weapons tests	USA USSR UK – F - PRC	1963	**2×10^{20}**	Fission Products Actinides
Windscale	UK	1957	1×10^{15}	^{131}I
Chelyabinsk (Kysthym)	USSR	1957	8×10^{16}	Fission Products ^{90}Sr, ^{137}Cs
Harrisburg	USA	1979	1×10^{12}	Noble Gases, ^{131}I
Chernobyl	USSR	1986	2×10^{18}	^{137}Cs

Technology-Enhanced Learning

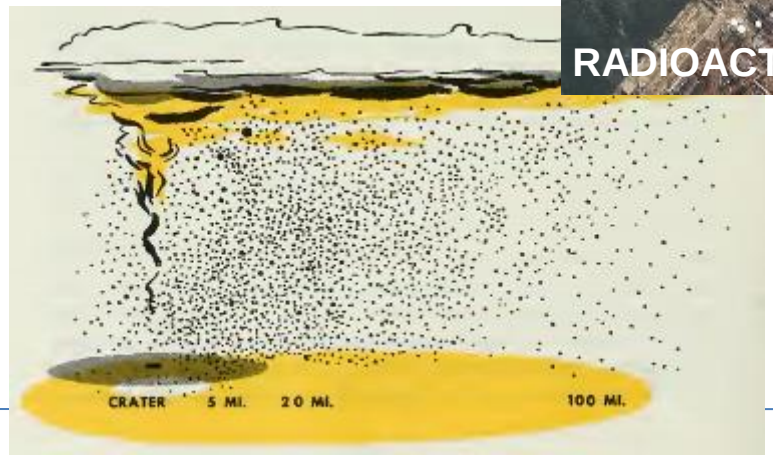
Advanced multimedia tools enable specialized training in high-risk or complex fields (e.g., CBRN solve—Chemical, Biological, Radiological, Nuclear).

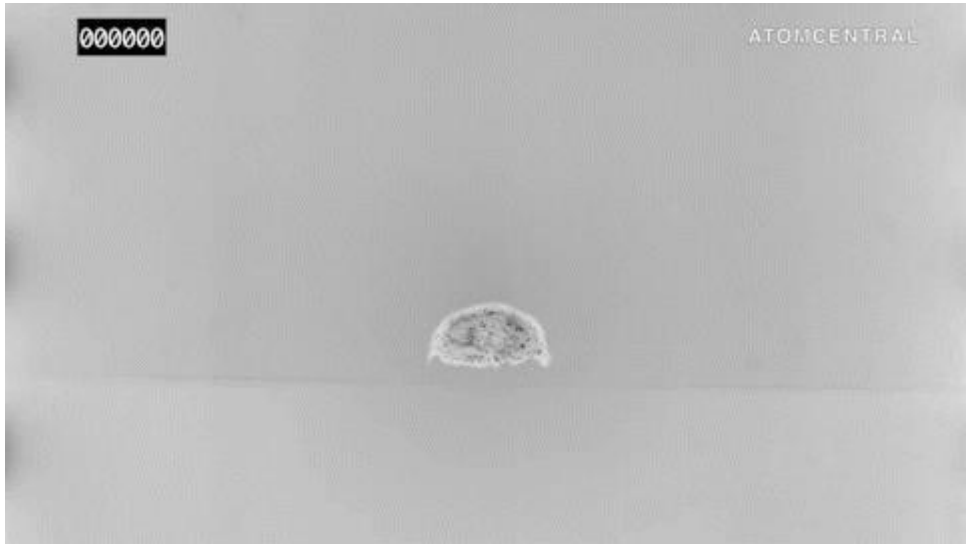
The Beirut explosion occurred in the port area of the Lebanese city on August 4, 2020 at around 6:08 p.m.

The explosion was estimated to have effects equivalent to the detonation of a few hundred to 1200 tons of TNT.

Technology-Enhanced Learning

The use of a software that manages the enormous flow of information

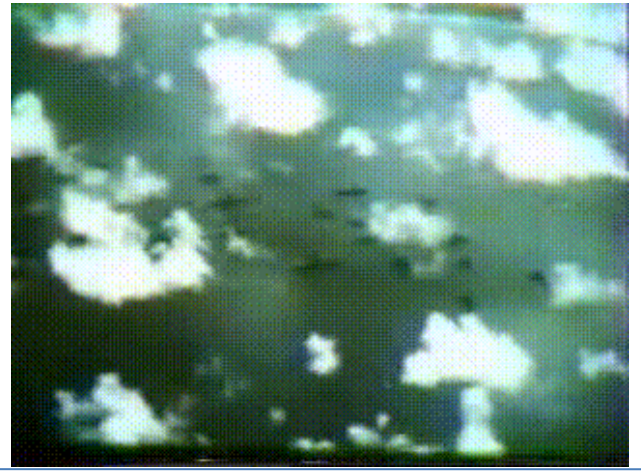


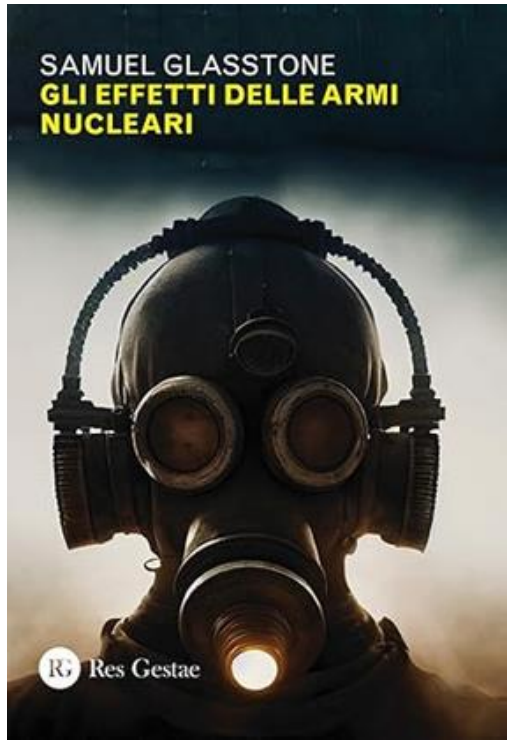


Technology-Enhanced Learning

The predictive method for nuclear explosion was developed by the United States Department of Defense

[redacted]

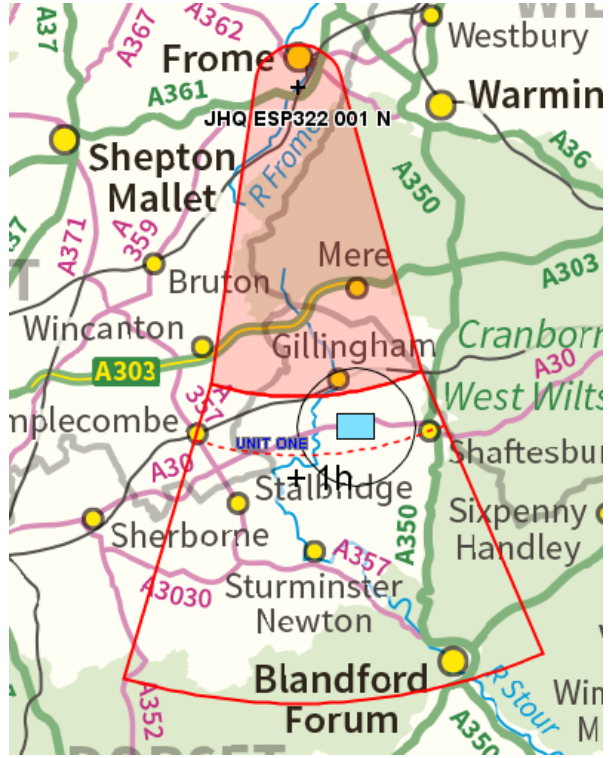


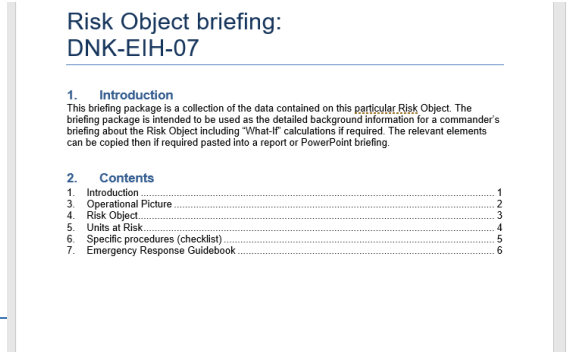


Virtual Reality (VR) & Simulation Software

Simulation Software : **CBRN Analisys Software** (e.g., Bruhn NewTech's NATO-approved system):

- Predicts hazard zones using real-time data (weather, geolocation).
- Supports decision-making in nuclear/radiological incidents.
- Features Computer-Assisted Exercises (CAX) for operational readiness.



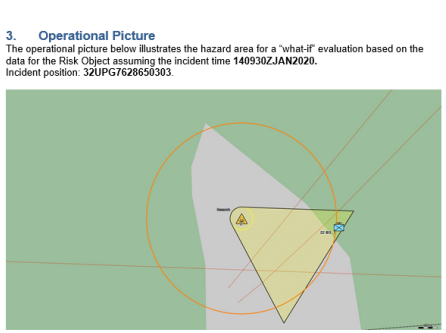


Risk Object briefing:
DNK-EIH-07

1. Introduction

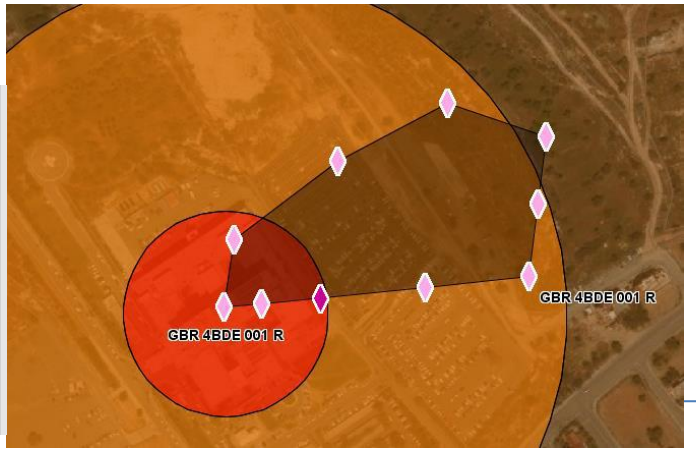
This briefing package is a collection of the data contained on this particular Risk Object. The briefing package is intended to be used as the detailed background information for a commander's briefing about the Risk Object including "What-If" calculations if required. The relevant elements can be copied then if required pasted into a report or PowerPoint briefing.

2. Contents



3. Operational Picture

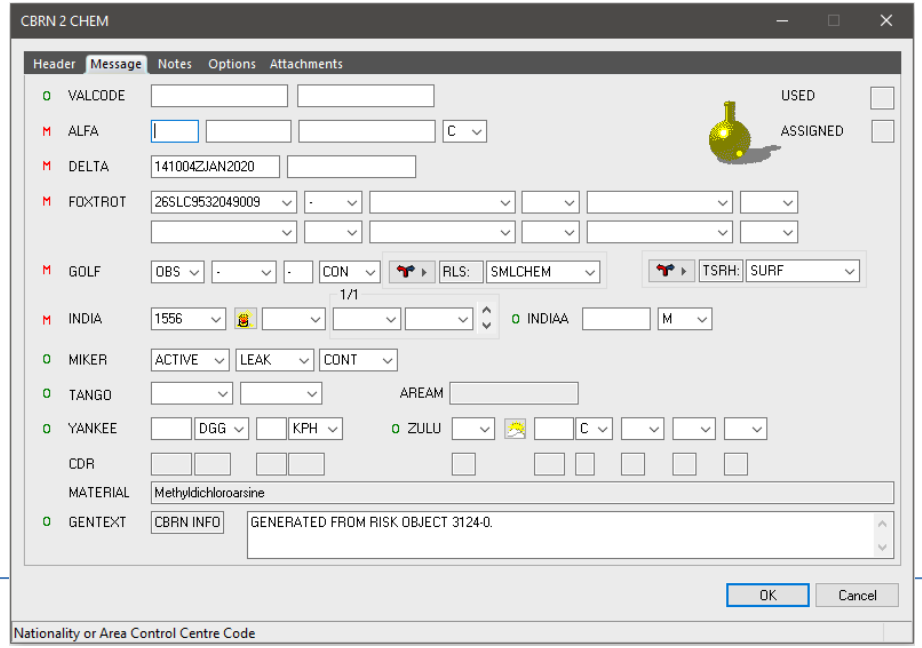
The operational picture below illustrates the hazard area for a "what-if" evaluation based on the data for the Risk Object assuming the incident time **140930ZJAN2020.**
Incident position: **32UPG7628650303**.

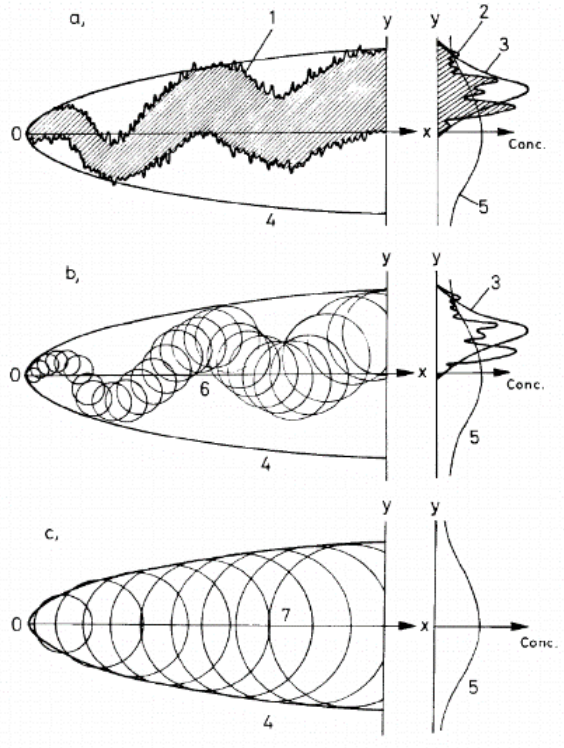


CBRN Analisys Software

Principal Key Functions:

- Automated hazard area mapping.
- Integration with atmospheric dispersion models (e.g., RIMPUFF).
- Customizable risk-object databases for scenario planning.
- CAX Exercise Workflow (Computer Assisted eXercises)

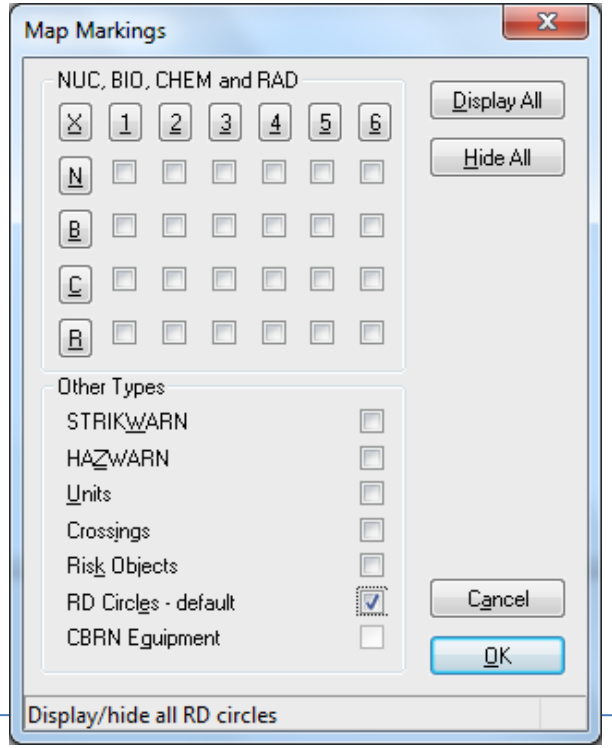


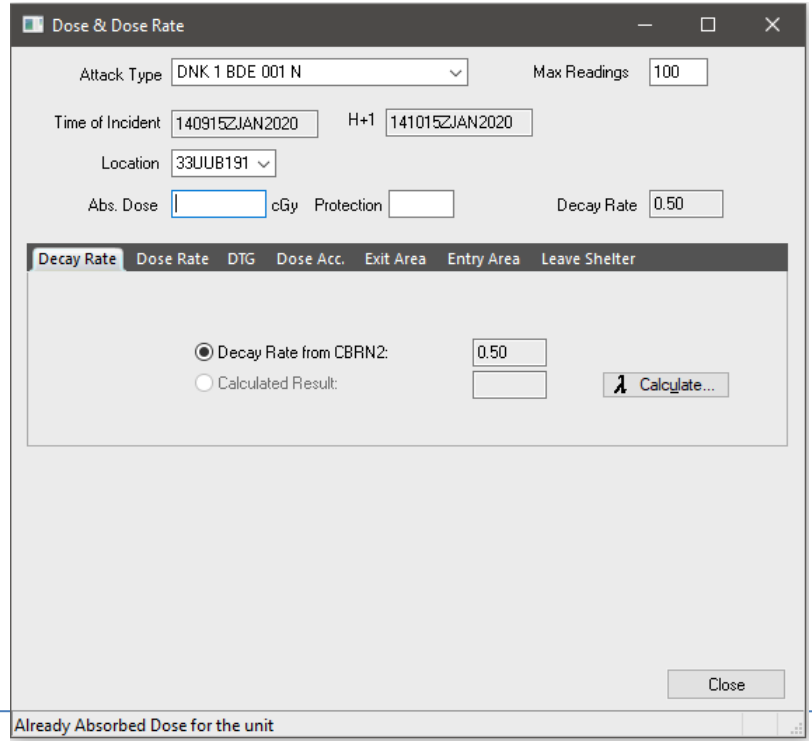


CBRN Analisys Software

Support to the three pillars of CBRN Defence: ***Prevent, Protect & Recover***

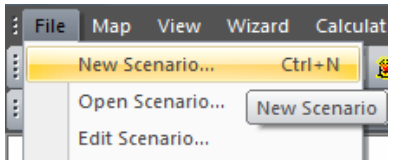
It’s Compatible with a wide range of raster, vector and satellite image formats. Support links to OGC (Open Geospatial Consortium) web services with WMS data (Web Map Service).

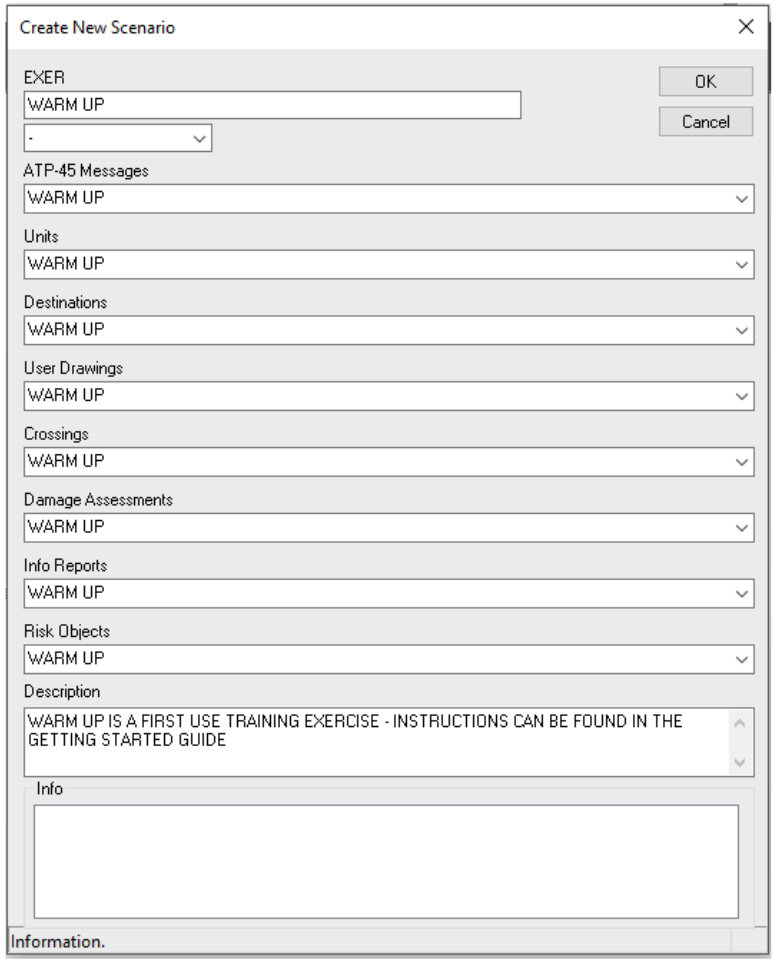


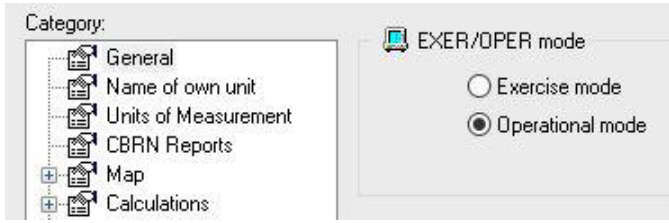


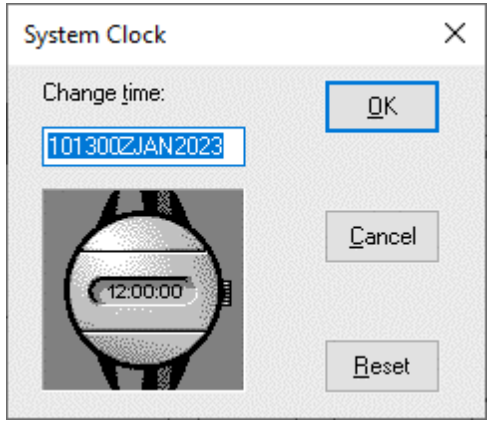
CBRN Analisys Software

The Application uses the scenario databases to store each exercise/operation under a name defined by the Operator.



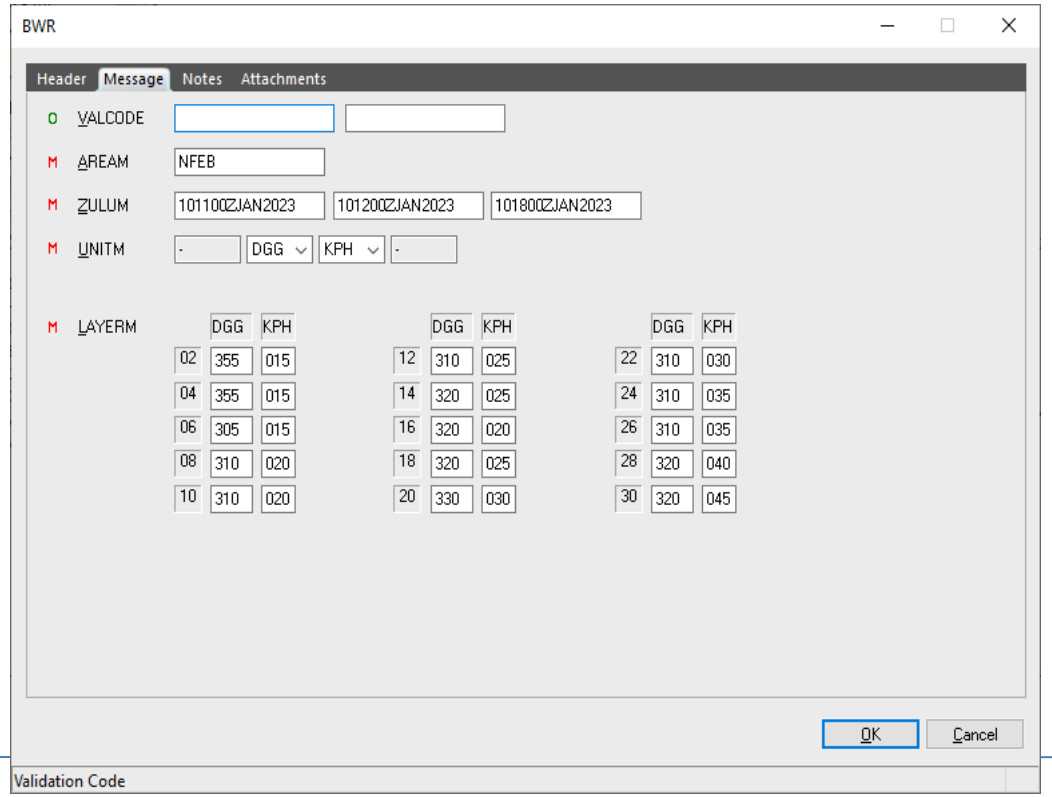






Weather information.

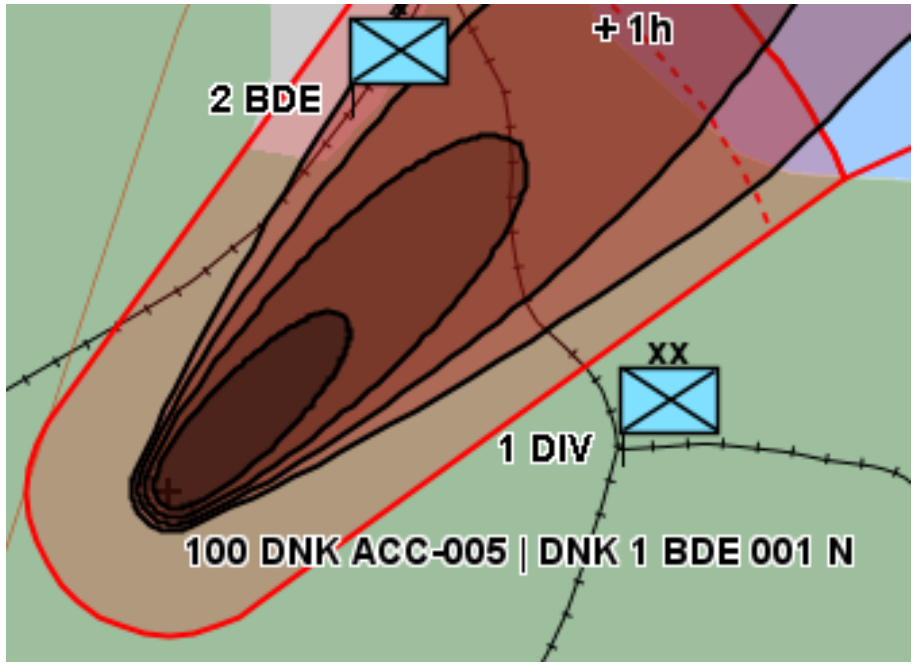
- **BWR** (Basic Wind Report.
- **CDR** (Chemical downwind report) .

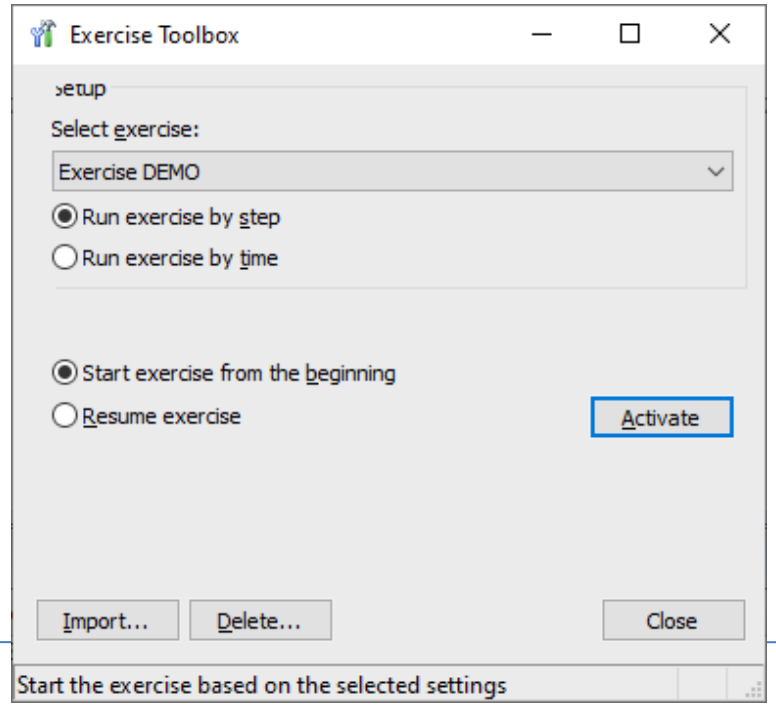


AREAM/NFEB//
ZULUM/101100ZJAN2023/101200ZJAN2023/101800ZJAN2023//
UNITM/-/DGG/KPH/-//
LAYERM/02/355/015/
04/355/015/
06/305/015/
08/310/020/
10/310/020/
12/310/025/
14/320/025/
16/320/020/
18/320/025/
20/330/030/
22/310/030/
24/310/035/
26/310/035/
28/320/040/
30/320/045//

The CBRN-Analysis CAX

(*Computer Assisted Exercise*)

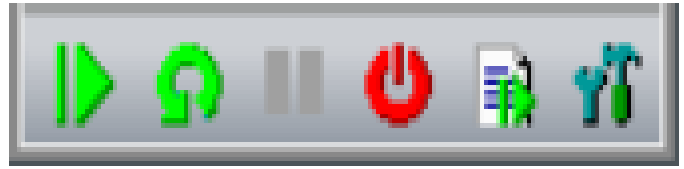




Select:

- Exercise Demo
- Run Exercise by step
- Start exercise from the beginning

Click Activate



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HPAC

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- National Capital Region

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Eglin Air Force Base, Fla.
Omaha, Neb. (USSTRATCOM)
Albuquerque, N.M.
White Sands Missile Range, N.M.
Mercury, Nev.
Travis Air Force Base, Ca.
Honolulu, Hawaii

OTHER COUNTRIES
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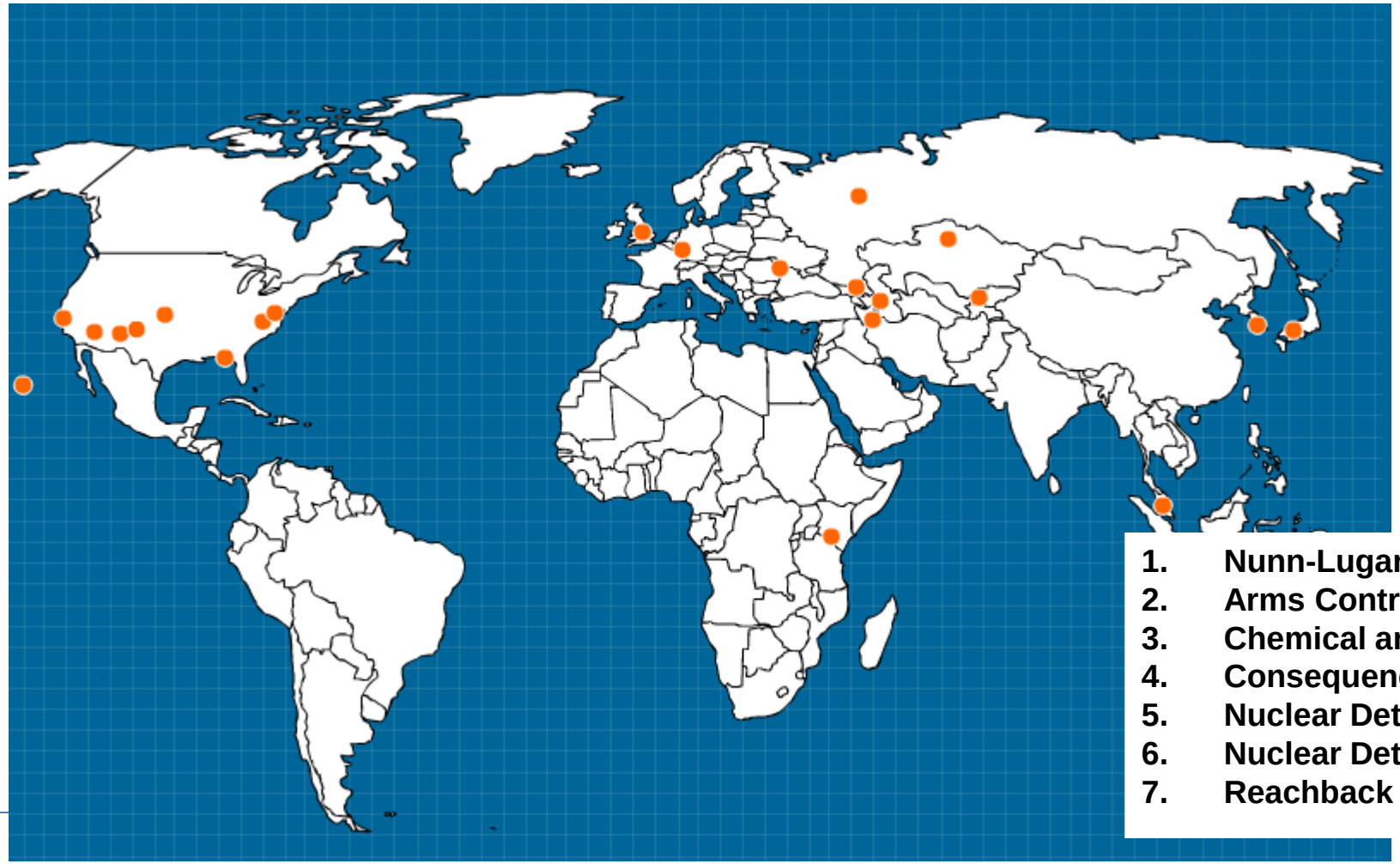
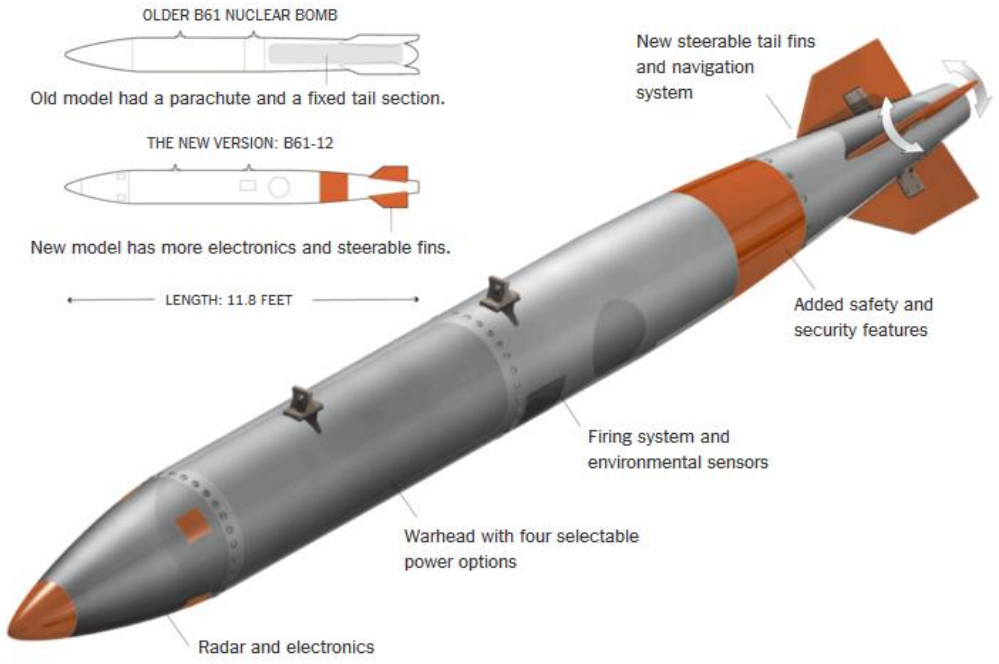
Kaiserslautern, Germany
Kiev, Ukraine
Nairobi, Kenya
Moscow, Russia
Tbilisi, Georgia
Yerevan, Armenia
Baku, Azerbaijan
Astana, Kazakhstan
Tashkent, Uzbekistan
United States Forces Korea, Republic of Korea
Yokota, Japan
Singapore



1. **Nunn-Lugar Global Cooperative Initiative**
2. **Arms Control and Verification**
3. **Chemical and Biological Defense**
4. **Consequence Management**
5. **Nuclear Deterrence and Defense**
6. **Nuclear Deterrence and Forensics**
7. **Reachback**

Nuclear Earth-Penetrator Weapons (EPWs)



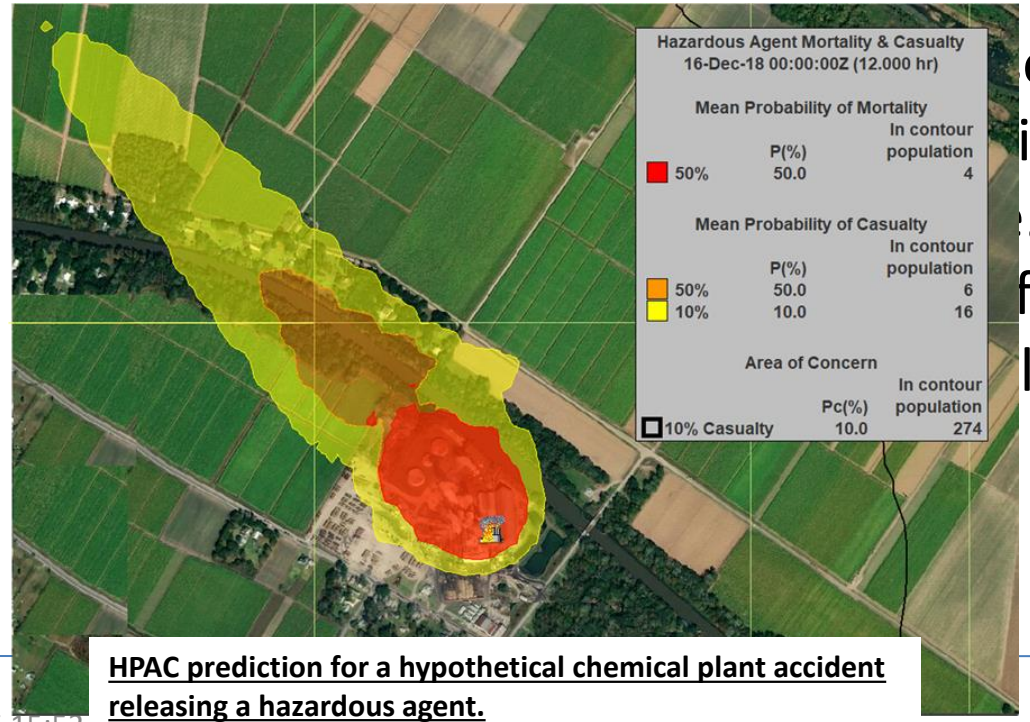
Source: Federation of American Scientists

With these new bombs it has been calculated that it is possible to reach difficult targets.
Using a nuclear EPW it is possible to destroy about 200 meters with a 300 kiloton weapon and 300 meters with a 1 megaton weapon.

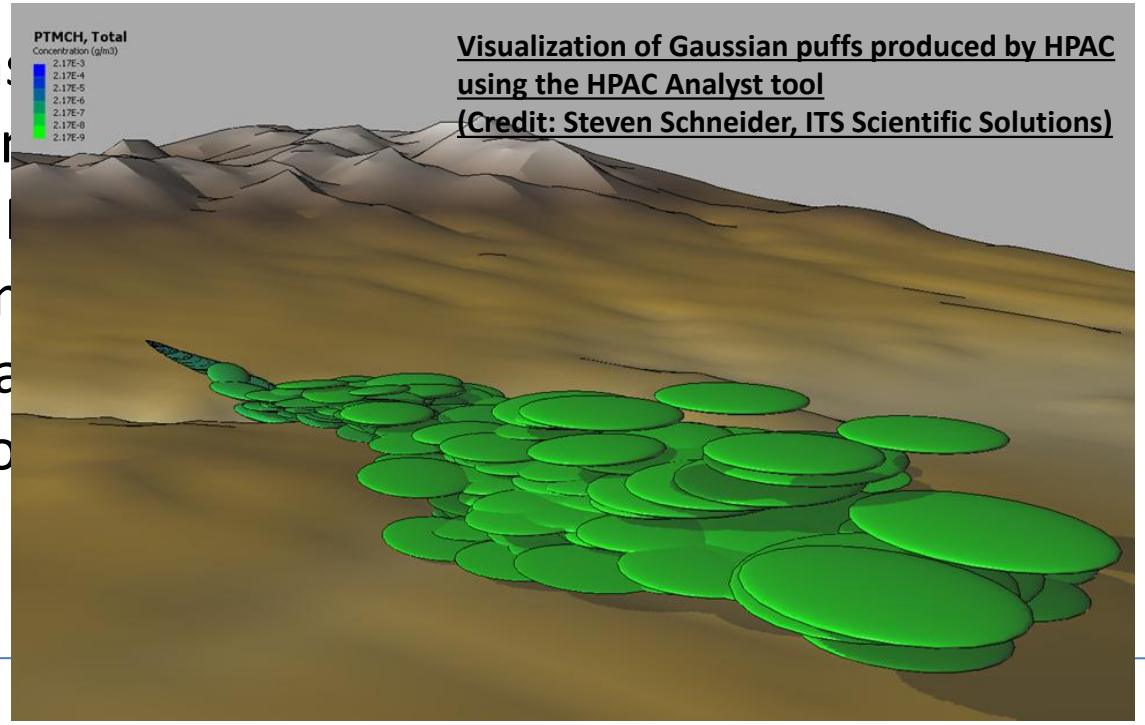
HPAC

DEFENSE THREAT REDUCTION AGENCY

The Hazard Prediction and Assessment Capability (HPAC) software tool is one such solution.



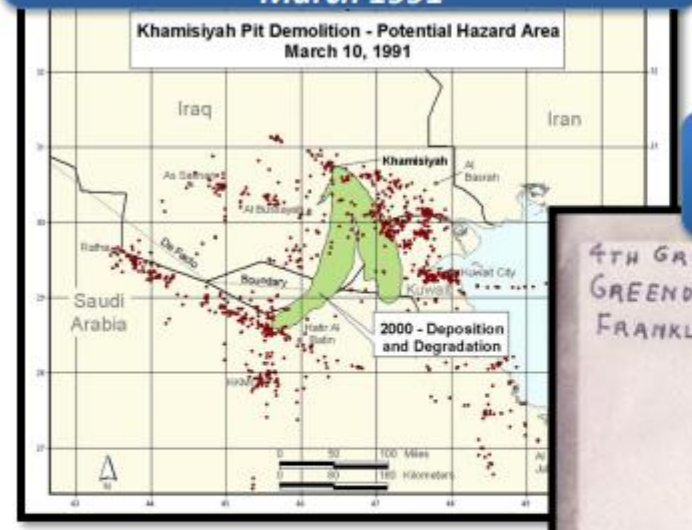
HPAC prediction for a hypothetical chemical plant accident releasing a hazardous agent.



Visualization of Gaussian puffs produced by HPAC using the HPAC Analyst tool (Credit: Steven Schneider, ITS Scientific Solutions)

WHY HPAC

Khamisiyah Chemical Weapon Demolition
March 1991



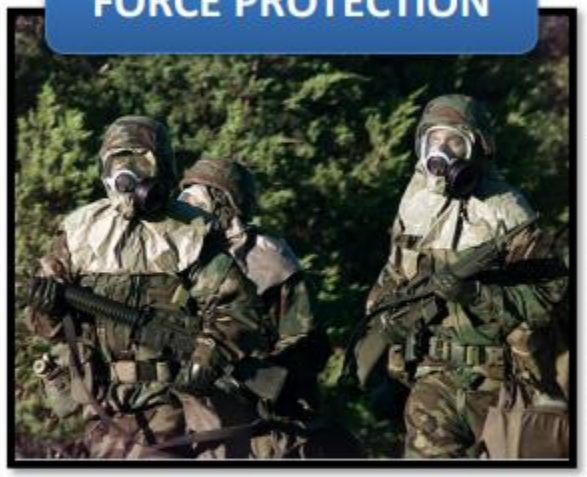
Anthrax Letter Attacks
September 2001

Fukushima Daiichi Nuclear Disaster
March 2011

HPAC

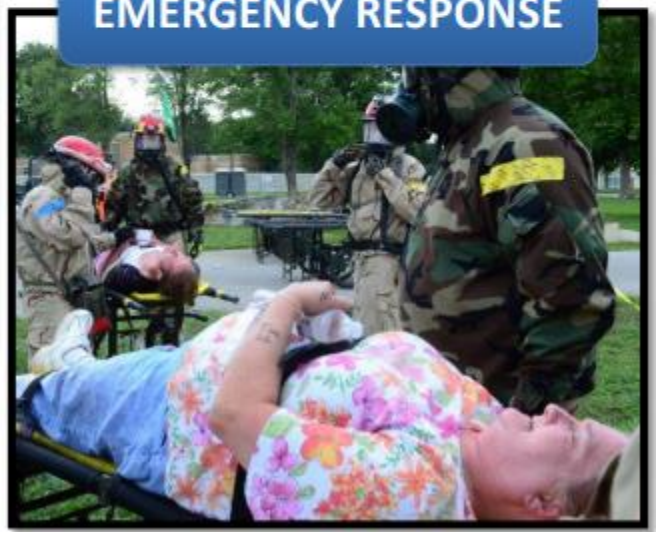
Predict the transport and dispersion of a CBRN release into the atmosphere and the collateral effects to civilian and military populations

FORCE PROTECTION



TARGET ANALYSIS

EMERGENCY RESPONSE



Three Mission Areas Supported

HPAC

HAZARD SOURCE DEFINITION

How much CBRN agent was released?

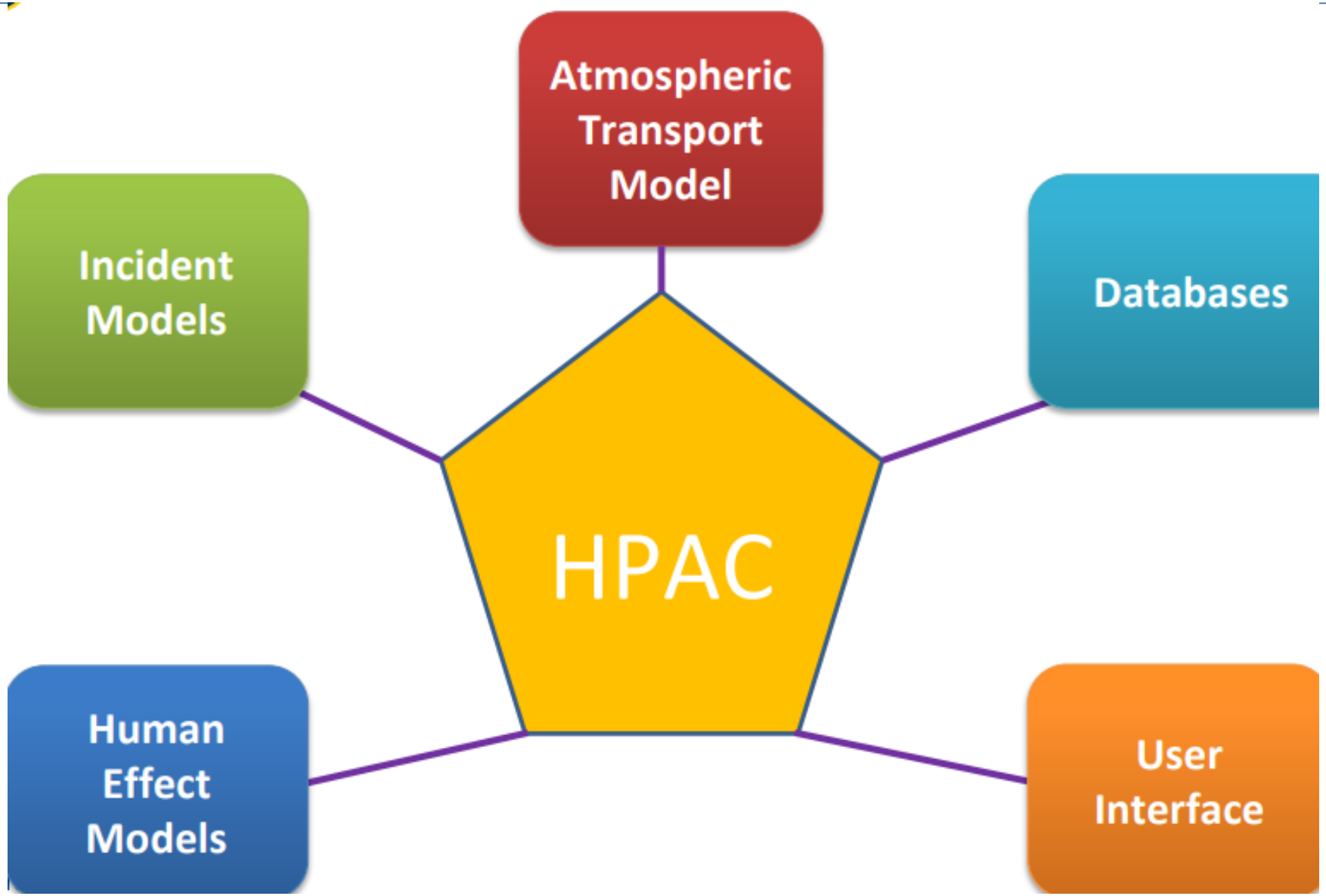
WEATHER AND TRANSPORT

Where did the CBRN agent go?

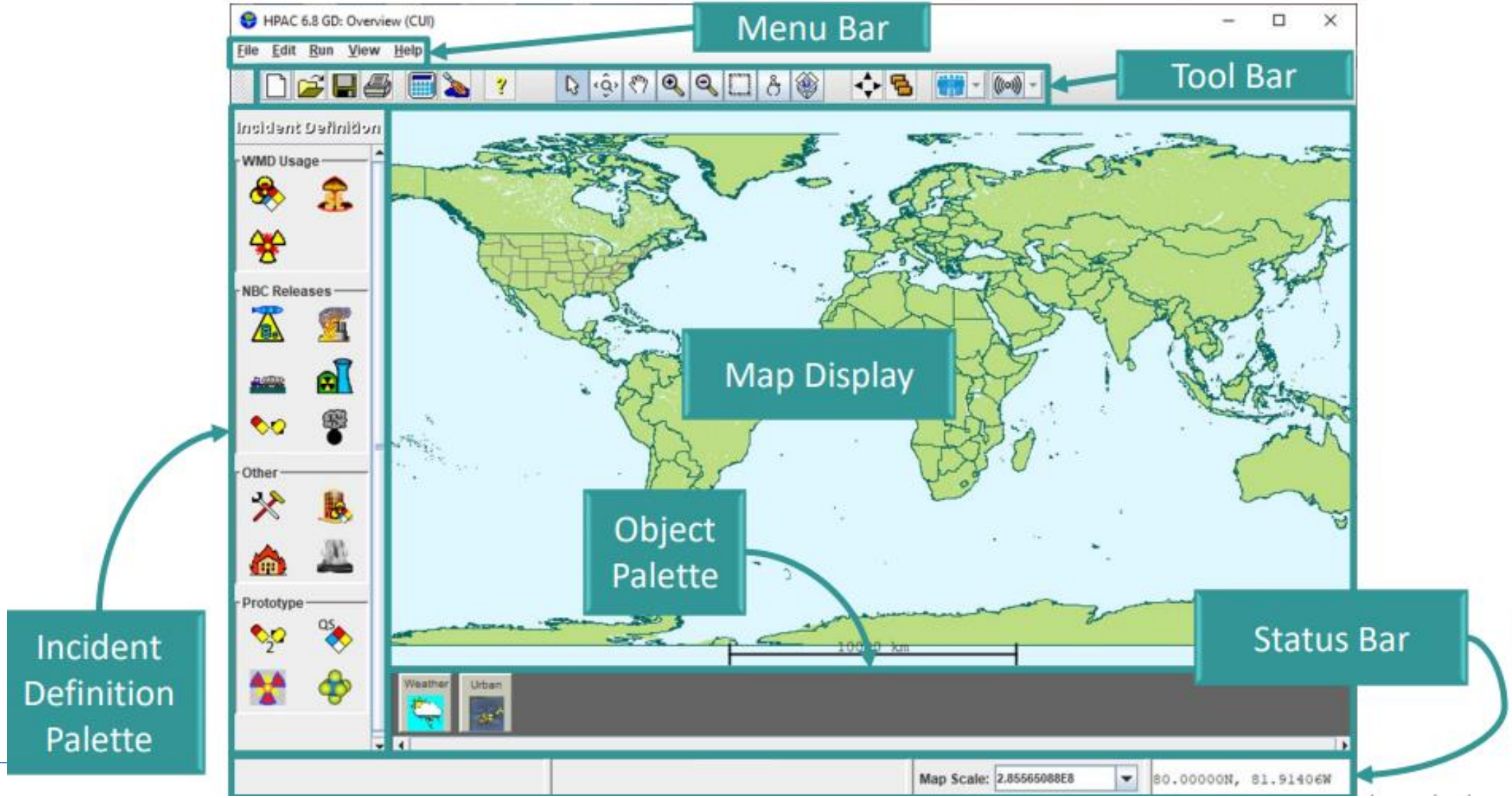
COLLATERAL EFFECTS

How did the CBRN agent impact the surrounding area/population?

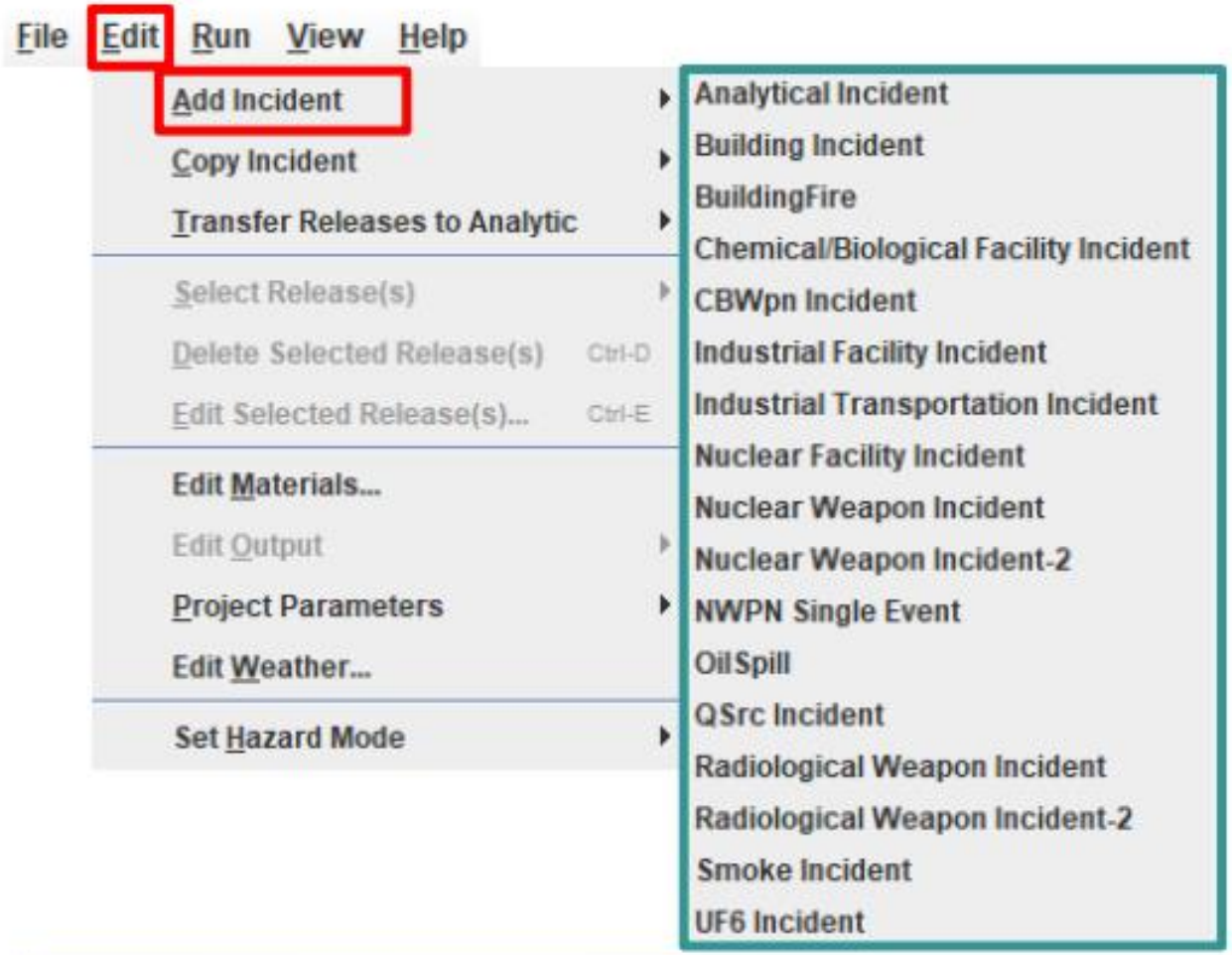
A Well-structured training program

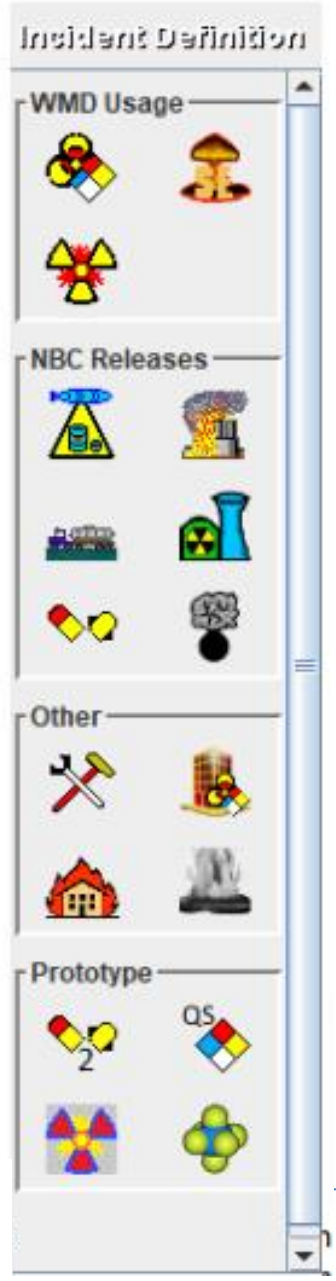


HPAC


HPAC 6.8 GD: Overview (CUI)
File Edit Run View Help
Menu Bar
Tool Bar
Incident Definition
WMD Usage
NBC Releases
Other
Prototype
Map Display
Object Palette
Incident Definition Palette
Status Bar
Weather
Urban
Map Scale: 2.85565088E8
80.00000N, 81.91406W

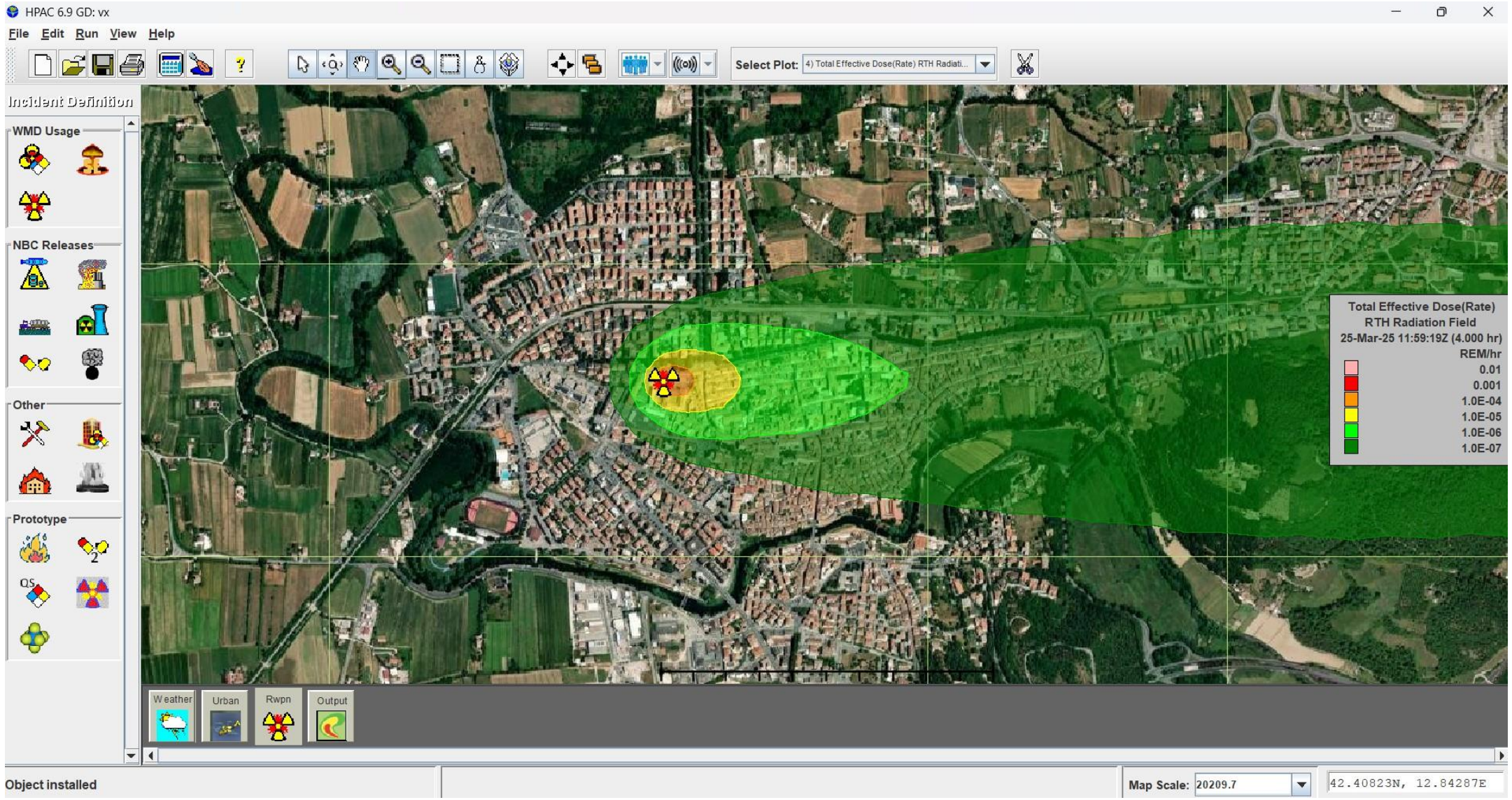
HPAC



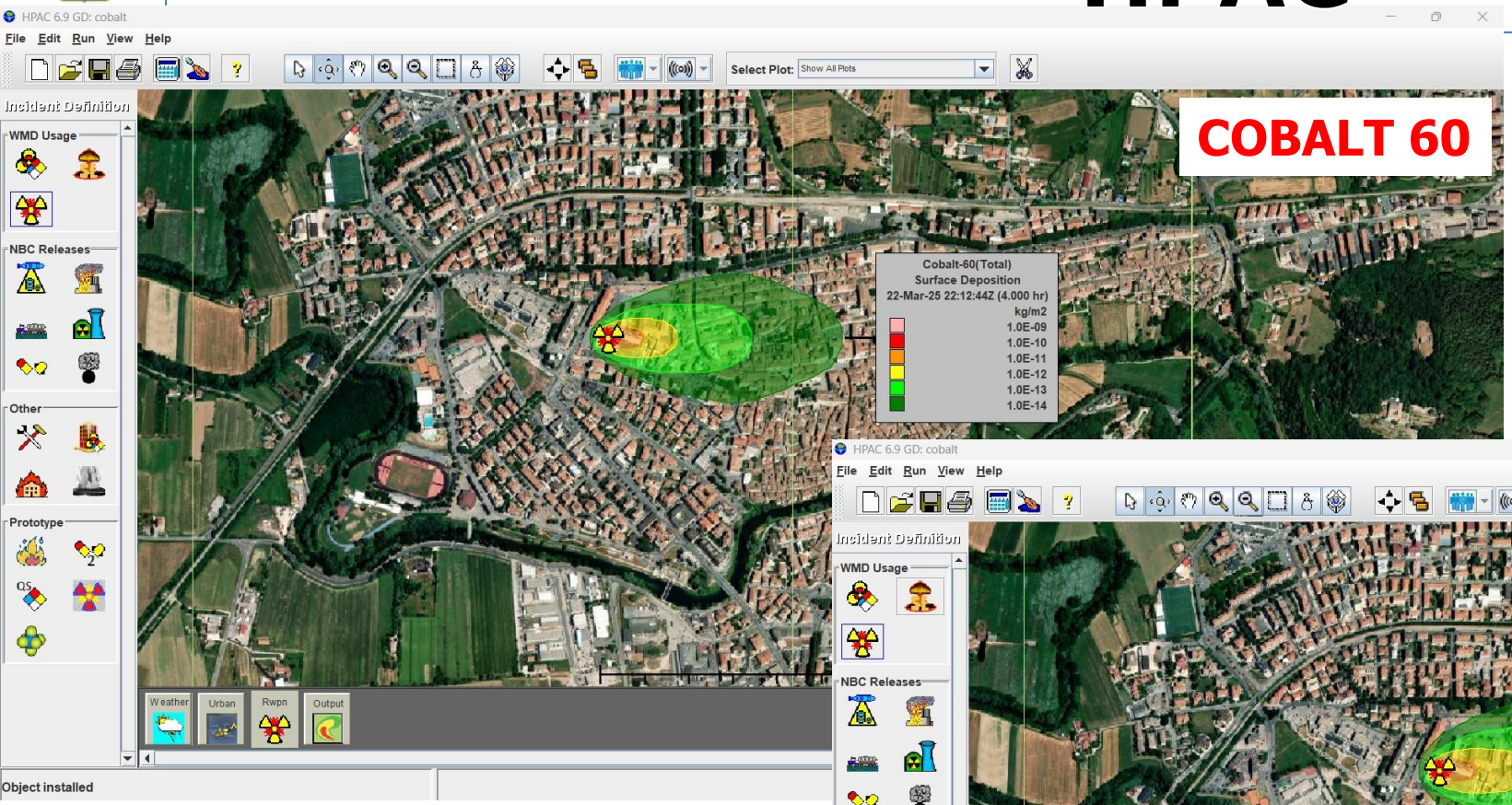


Left click: "Edit"
Hover over: "Add Incident"

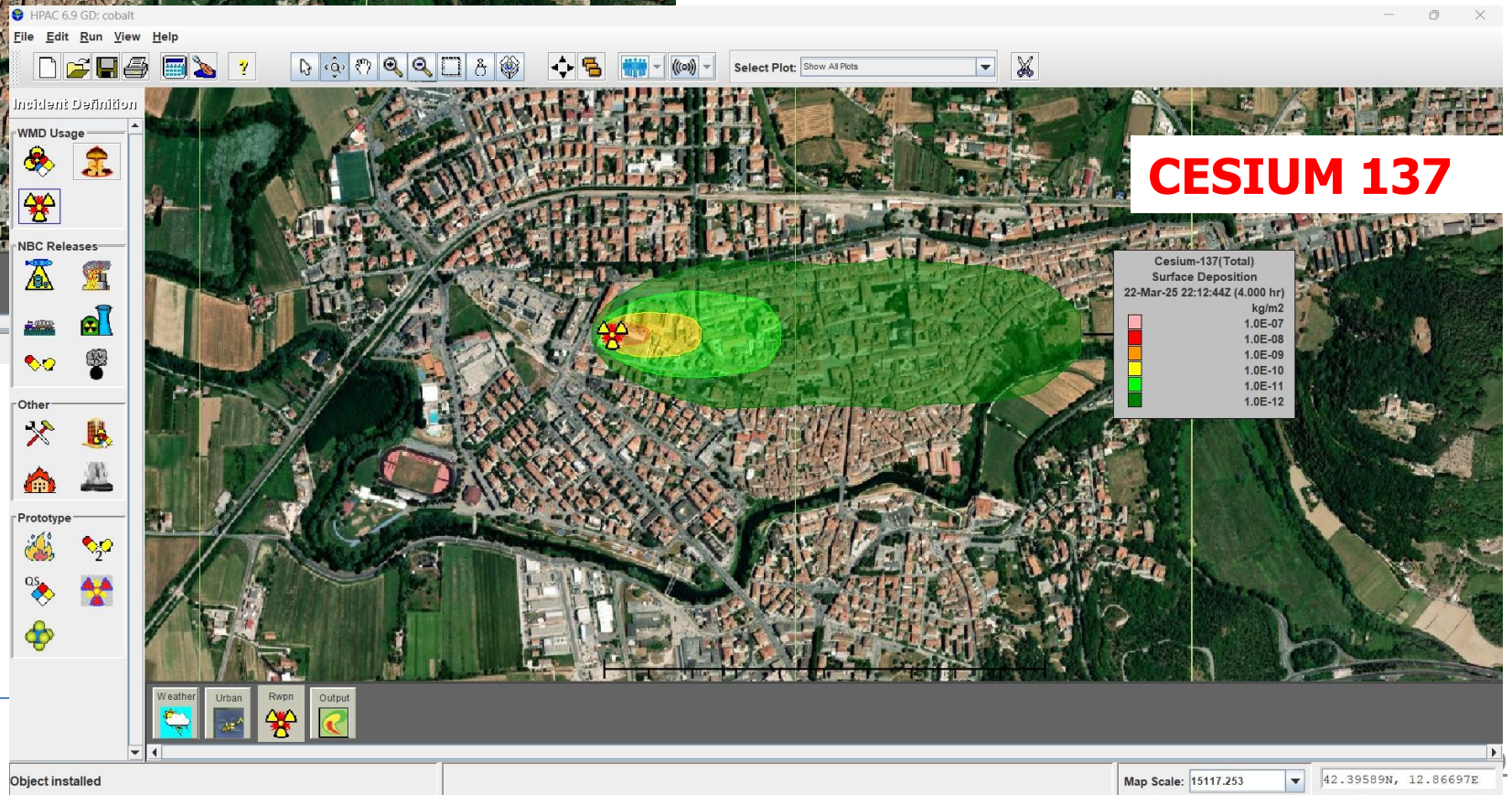
HPAC


HPAC 6.9 GD: vx
File Edit Run View Help
Select Plot: 4) Total Effective Dose(Rate) RTH Radiati...
Incident Definition
WMD Usage
NBC Releases
Other
Prototype
Total Effective Dose(Rate)
RTH Radiation Field
25-Mar-25 11:59:19Z (4.000 hr)
REM/hr
0.01
0.001
1.0E-04
1.0E-05
1.0E-06
1.0E-07
Weather
Urban
Rwpn
Output
Object installed
Map Scale: 20209.7
42.40823N, 12.84287E

HPAC

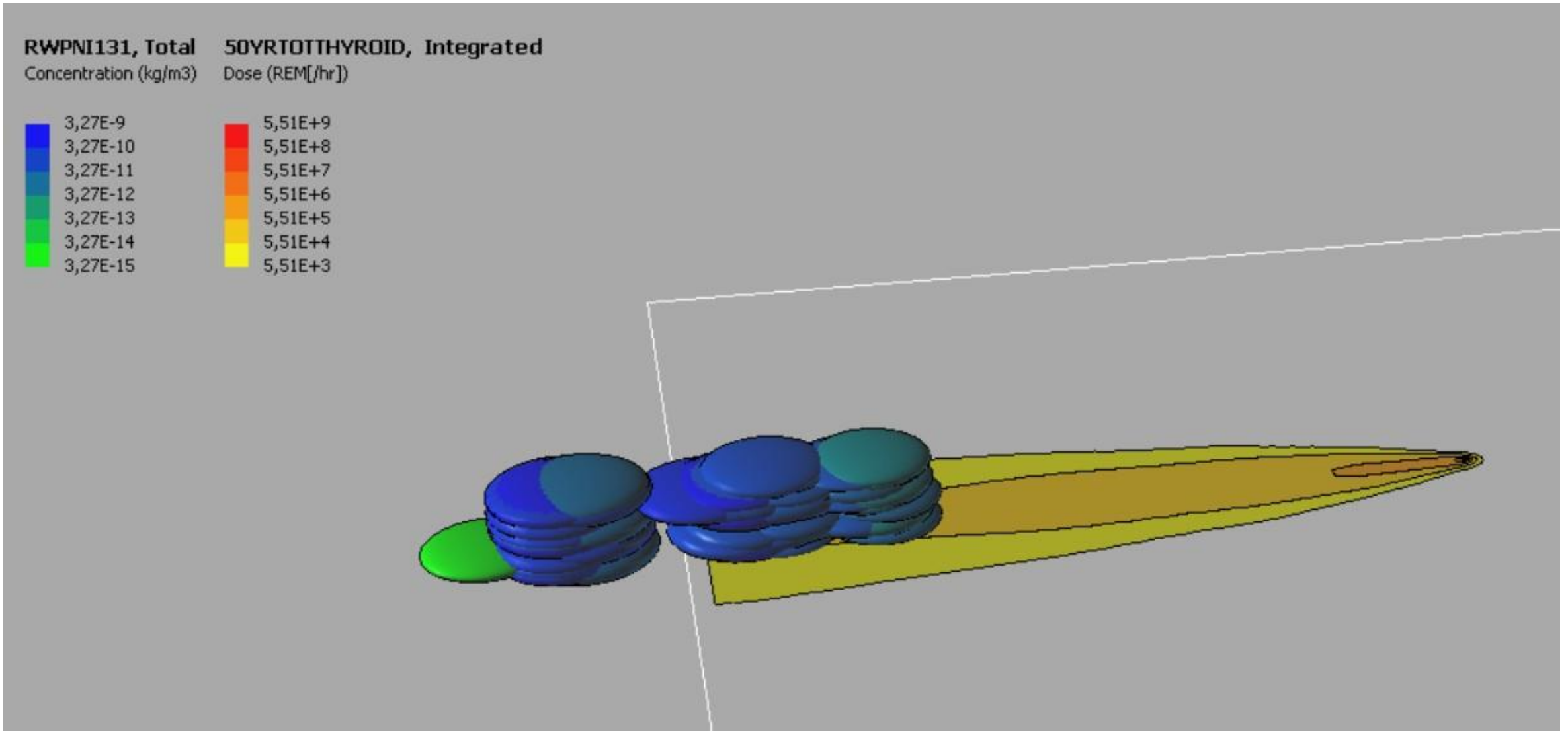


COBALT 60



CESIUM 137

HPAC


RWPNI131, Total
Concentration (kg/m3)
3,27E-9
3,27E-10
3,27E-11
3,27E-12
3,27E-13
3,27E-14
3,27E-15
50YRTOTTHYROID, Integrated
Dose (REM[/hr])
5,51E+9
5,51E+8
5,51E+7
5,51E+6
5,51E+5
5,51E+4
5,51E+3

A Well-structured training program

QUESTIONS?