

Lisa Tomlin

Instructional Designer/Developer

Lisa Tomlin is an instructional designer, eLearning developer, and multimedia specialist with more than 20 years of experience creating effective training solutions for government, defense, renewable energy, and technical organizations.

Her expertise includes adult learning, Articulate Storyline 360, learning management systems, graphic design, video, audio, animation, and scriptwriting. Lisa works collaboratively with subject-matter experts and stakeholders to develop engaging, performance-focused learning experiences that support organizational goals and learner needs.

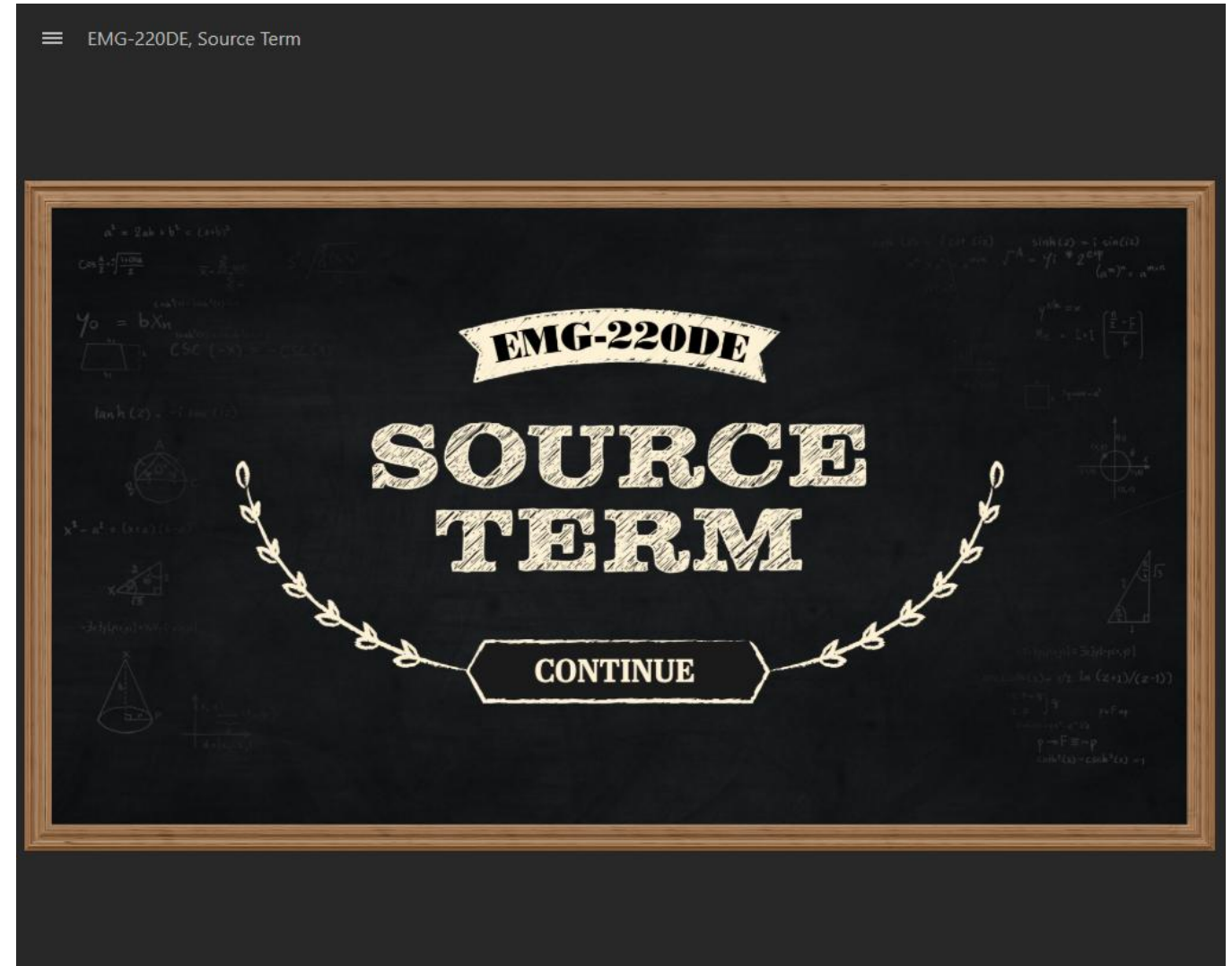


Source Term

Source Term is a fully interactive e-learning module designed to teach a complex technical concept through multimedia instruction, guided exploration, and progressive assessment.

The course integrates synchronized caption video, click-and-reveal interactions, timeline-based animations, and scenario-driven exercises to support different learning styles and accessibility needs.

Learners move through a structured sequence of instruction, practice, and evaluation, culminating in a final quiz that measures comprehension and readiness.



Source Term Title Slide

Context

eLearning module

Audience

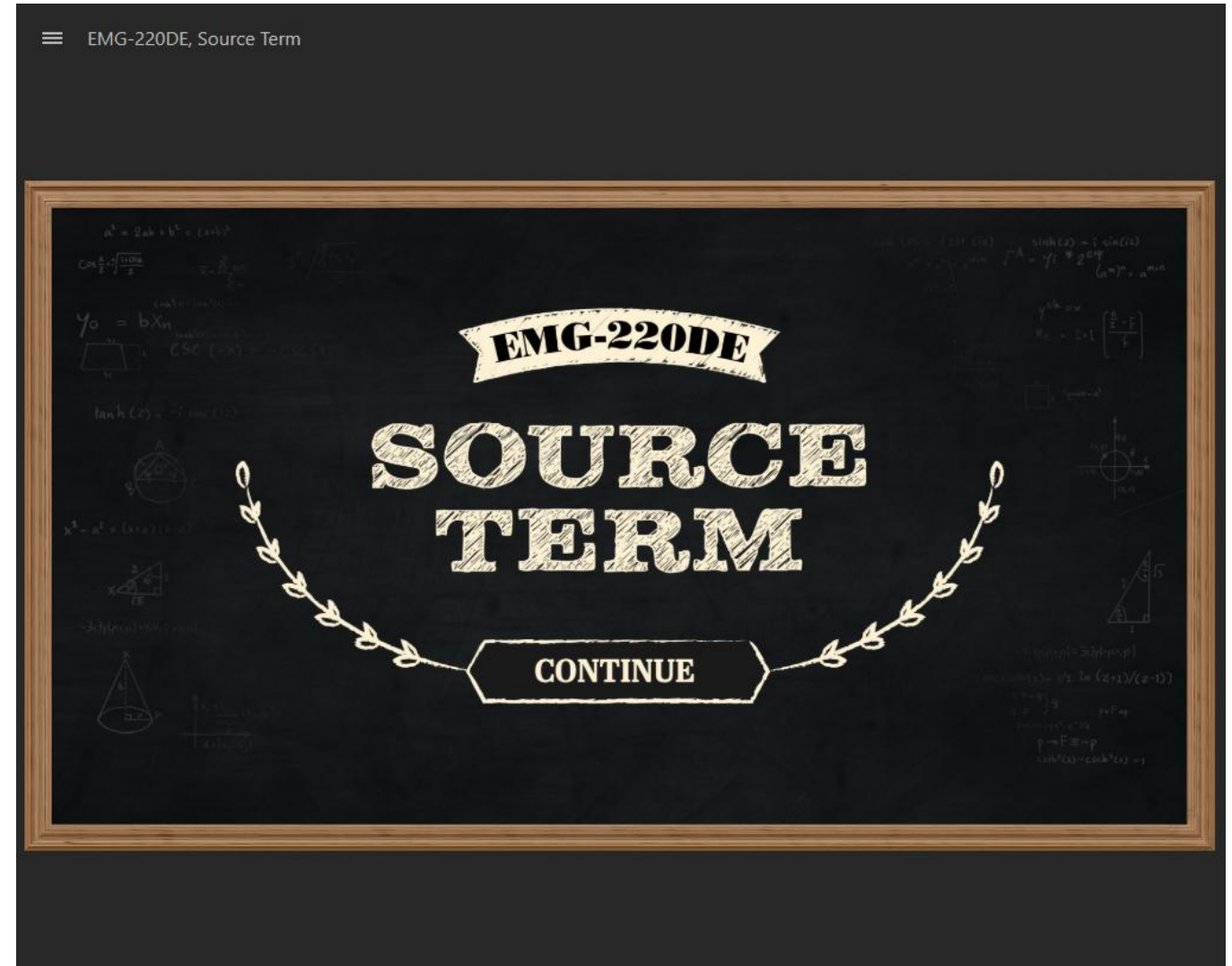
DOE personnel (employees and contractors)

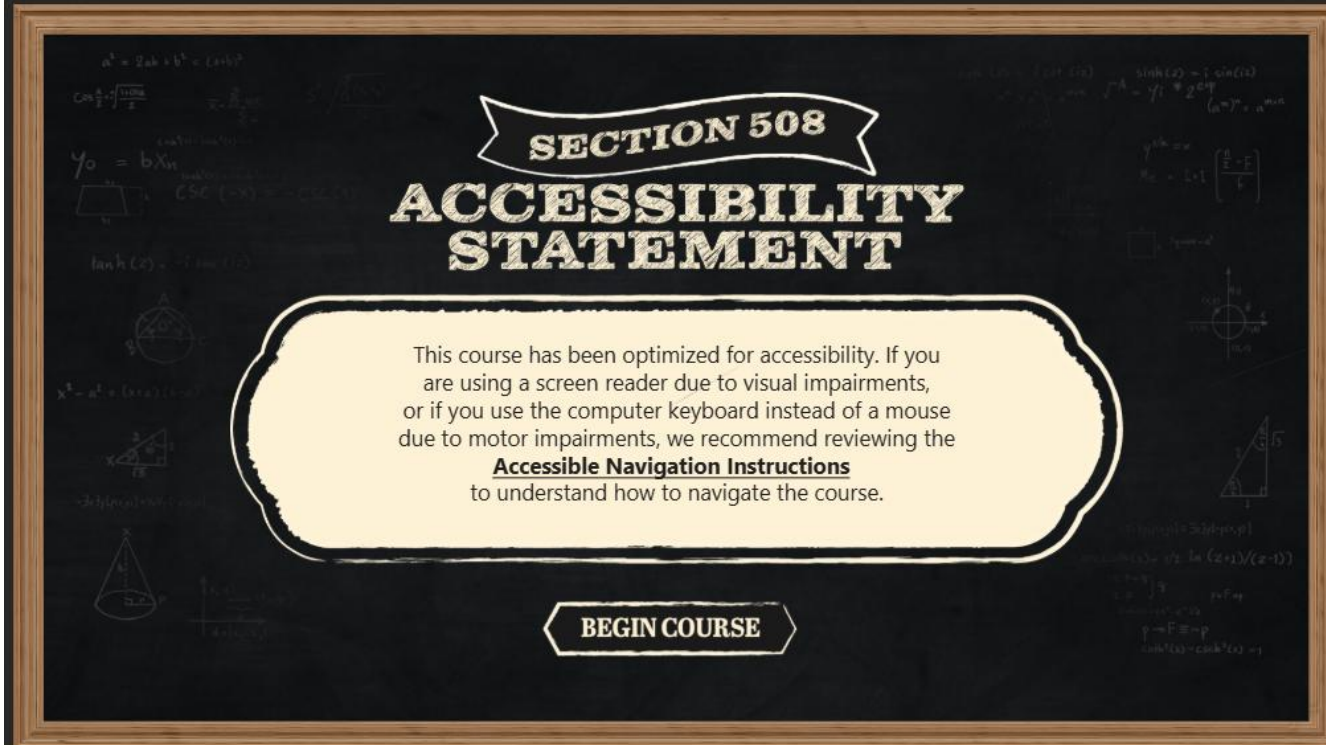
Course Design

I managed course development through weekly coordination with subject matter experts. My responsibilities included preparing the design document, developing course content and final quiz questions, and coordinated the course rollout in the LMS.

Media Development

In collaboration with the media team, I contributed to video script development and the selection of on-screen talent and narrator voice. I also created assets in Articulate 360 for timeline animations and programmed all course interactions.





Accessibility Statement Section 508

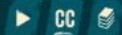
Learning Strategy

Compliance, learner inclusion

Interactive Elements

Clickable button

SOURCE TERM ATMOSPHERE



You're drifting through

A-Z < >

Introduction Video

Learning Strategy

- Multimedia instruction
- Multi-modality learning
 - visual movie, narration, closed caption, transcript tab

Interactive Elements

- Video player caption toggle
- Global Next/Back, Glossary and Resource buttons



Introduction Video

Learning Strategy

- Learner control, self-paced navigation
- Multi-modality learning
 - visual movie, narration, closed caption, transcript tab

Interactive Elements

- Video player caption toggle
- Global Next/Back, Glossary and Resource buttons

INITIATING INCIDENTS BARRIERS **SOURCE TERM** ATMOSPHERIC DISPERSION MODELING

Select each box above.

$$(MAR)(DR)(ARF)(RF)(LPF) = ST$$

Material at Risk Damage Ratio Airborne Release Fraction Release Fraction Leak Path Factor Source Term

of the mitigation systems.

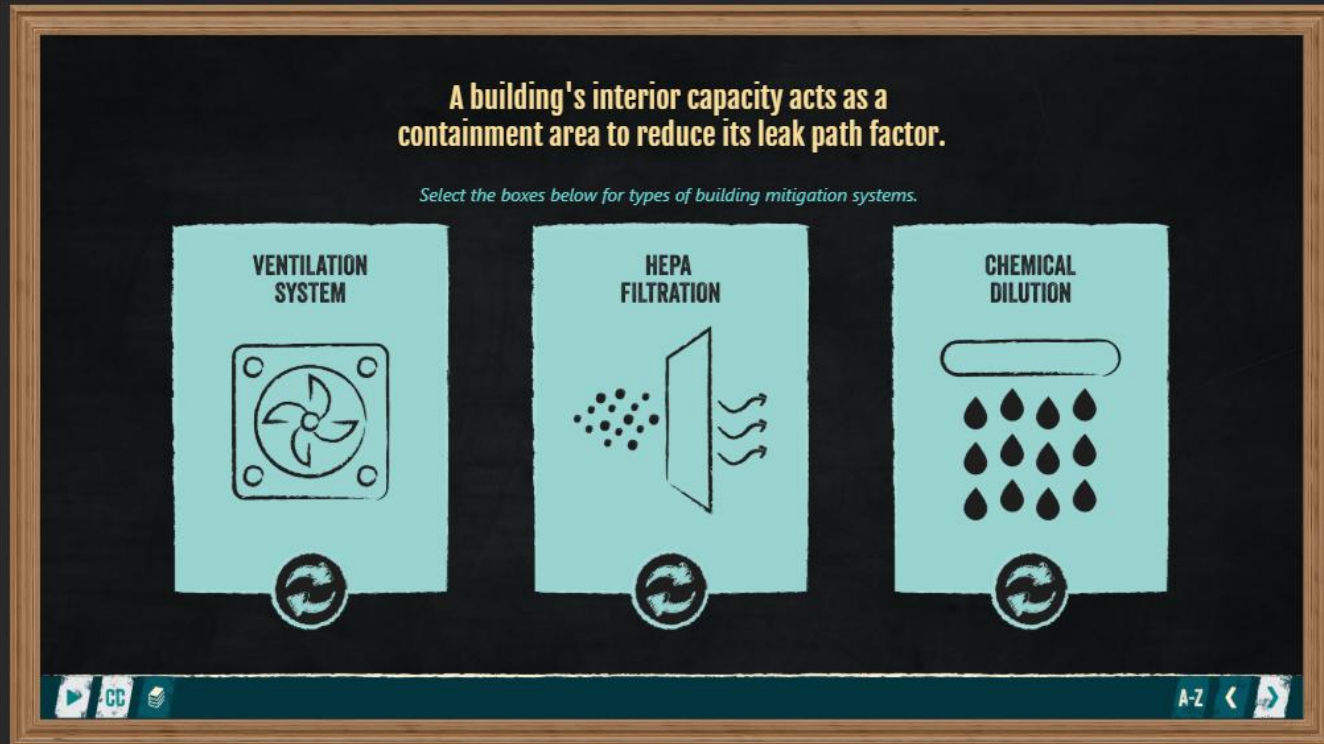
Click and Reveal Interactions

Learning Strategy

- Chunking complex information
- Discovery learning

Interactive Elements

- Click and reveal buttons
- Articulate timeline animation



Click and Reveal Interactions

Learning Strategy

- Chunking complex information
- Discovery learning

Interactive Elements

Click and reveal buttons (spin)

A building's interior capacity acts as a containment area to reduce its leak path factor.

Select the boxes below for types of building mitigation systems.

VENTILATION SYSTEM

Some buildings contain exhaust fans reducing the exposure of personnel inside but deliberately releasing more material outside.



HEPA FILTRATION

Some buildings contain filtration systems reducing the leak path factor. High Efficiency Particulate Air (HEPA) filter systems are 99.97% efficient in removing very small particles.



CHEMICAL DILUTION



 A-Z < 

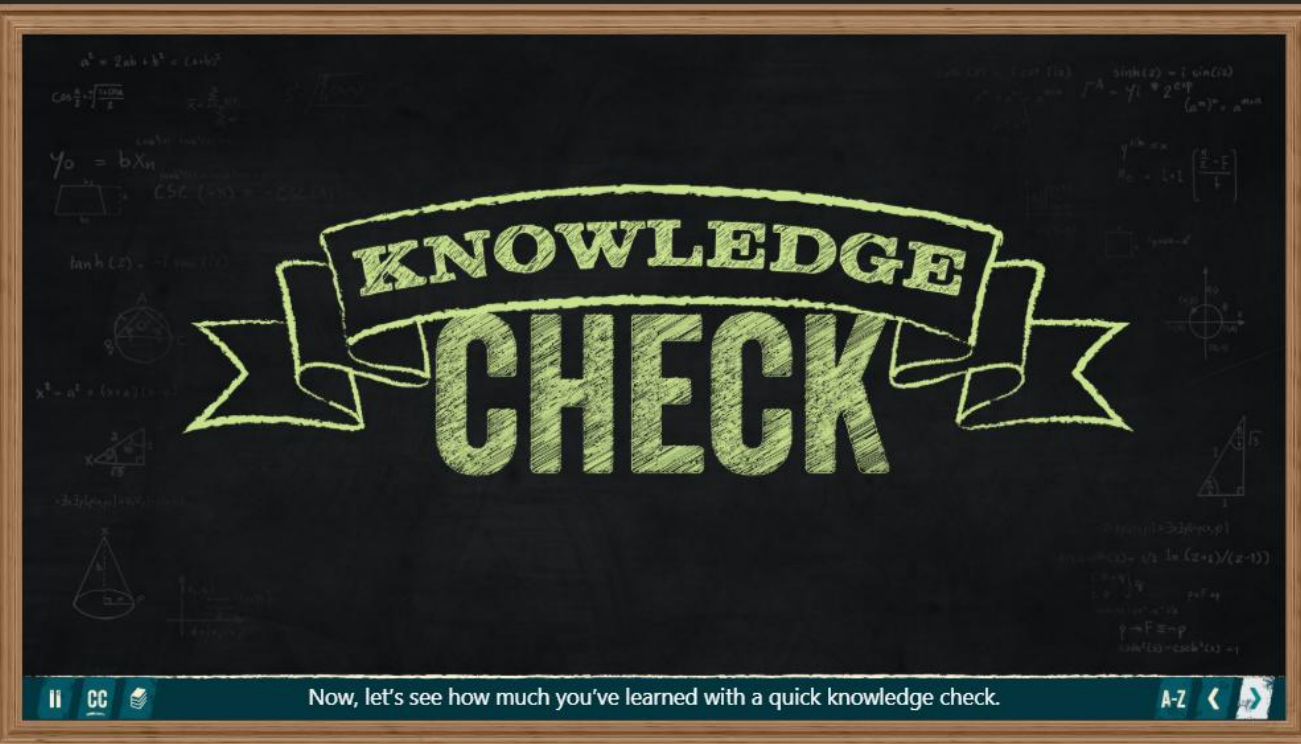
Click and Reveal Interactions

Learning Strategy

- Chunking complex information
- Discovery learning

Interactive Elements

Click and reveal buttons (spin)



Knowledge Check Introduction

Learning Strategy
Formative assessment

Select the correct factor below to complete the five-factor source term formula.

$$(\text{ }) () () () () =$$

What fraction of the material is available to be damaged or released before we apply any other factors?



~~ARE~~ ~~LPE~~ ~~RF~~ ~~DR~~ **MAR** ~~ST~~

Multiple Choice Questions

Learning Strategy

Formative assessment

Interactive Elements

- Question prompt
- Clickable multiple-choice buttons

Select the correct factor below to complete the five-factor source term formula.

(MAR) () () () () =

What fraction of the material is available to be damaged or released before we apply any other factors?



CORRECT

Material-at-Risk (MAR) is the total sum of material available to be damaged or released.

CONTINUE

Multiple Choice Questions + Correct Answers

Learning Strategy

- Formative assessment
- Feedback

Interactive Elements

Clickable button

Select the correct factor below to complete the five-factor source term formula.

(MAR) (DR) (ARF) (RF) () =

How does the building, process, or mitigating features trap, confine, or contain the potential airborne hazardous material?



~~ARF~~ **LPF** ~~RF~~ ~~DR~~ ~~MAR~~ **ST**

Multiple Choice Questions

Learning Strategy

Formative assessment

Interactive Elements

- Question prompt
- Clickable multiple-choice buttons

Select the correct factor below to complete the five-factor source term formula.

(MAR) (DR) (ARF) (RF) (LPF) =

How does the building, process, or mitigating features trap, confine, or contain the potential airborne hazardous material?



CORRECT

Leak Path Factor (LPF) determines the mitigating containment of airborne hazardous material.

CONTINUE

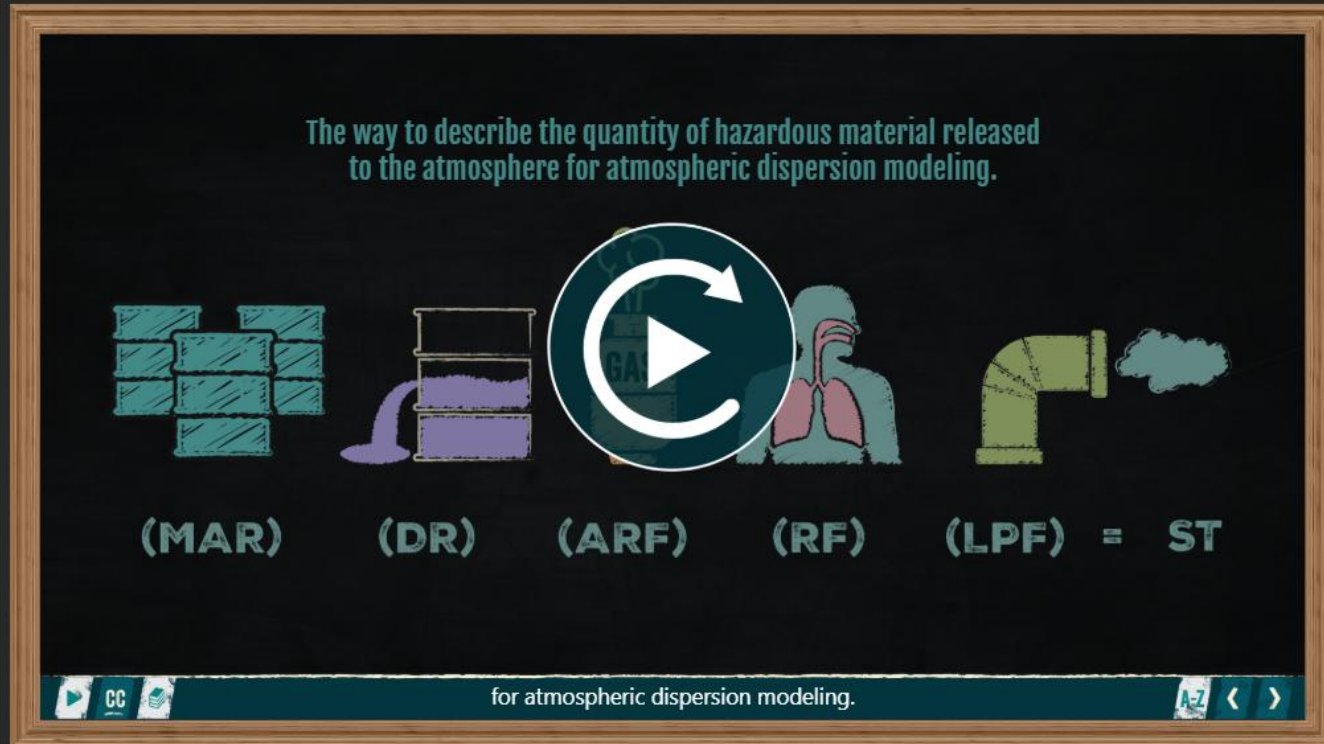
Multiple Choice Questions + Correct Answers

Learning Strategy

- Formative assessment
- Feedback

Interactive Elements

Clickable button



Knowledge Check Summary

Learning Strategy

Consolidation, visual reinforcement

Interactive Elements

- Timeline animation
- Video player caption toggle

MAXIMUM FISSION

Exercise 1

In the red field below, type the correct intermediate source term for Kr-85m.

SUBMIT

Table 6-8. Curies of Important Nuclides Released During Nuclear Excursion Involving Unirradiated, Unenriched Uranium Solution (400 g U/liter) (NRC, April 1979)

Nuclide	Half-life	Radioactivity, Ci		
		0 to 0.5 hr	0.5 to 8 hr	Total
Kr-83m	1.8 h	2.2E+1	1.4E+2	1.6E+2
Kr-85m	4.3 yr	2.1E+1	1.3E+2	1.5E+2
Kr-85	1.7 yr	2.2E-4	1.4E-3	1.6E-3

Isotope	Table 6-8	Multiply by Bounding Ratio	Intermediate Source Term
Kr-85m	1.5E+2	1E-2	?

Exercise

Learning Strategy

Applied practice, scenario-based learning

Interactive Elements

Input fields, reveal-answer button

MAXIMUM FISSION

Exercise 1

In the red field below, type the correct intermediate source term for Kr-85m.

CORRECT

That's right!

$$(1.5E+2)(1E-2) = 1.5E+0$$

CONTINUE

Table 6-8. Curies of Important Nuclides Released During Nuclear Excursion Involving Unirradiated, Unenriched Uranium Solution (400 g U/liter) (NRC, April 1979)

Nuclide	Half-life	Radioactivity, Ci		
		0 to 0.5 hr	0.5 to 8 hr	Total
Kr-83m	1.8 h	2.2E+1	1.4E+2	1.6E+2
Kr-85m	10.7 yr	1.5E+1	1.4E+2	1.5E+2
Kr-85	1.7 yr	2.2E-4	1.4E-3	1.6E-3

Isotope	Table 6-8	Multiply by Bounding Ratio	Intermediate Source Term
Kr-85m	1.5E+2	1E-2	1.5

Exercise + Correct Answer

Learning Strategy

Applied practice, scenario-based learning

Interactive Elements

Input fields, reveal-answer button

PRACTICAL SOURCE TERM ANALYSIS

Here is an opportunity to practice what you have learned.

Select each example below.

**GLOVEBOX
EXAMPLE**



✓

LEARN MORE

**PLUTONIUM HE
EXAMPLE**



✓

LEARN MORE

**NITRIC ACID
EXAMPLE**



✓

LEARN MORE

Select the Next Button to continue

A-Z < >

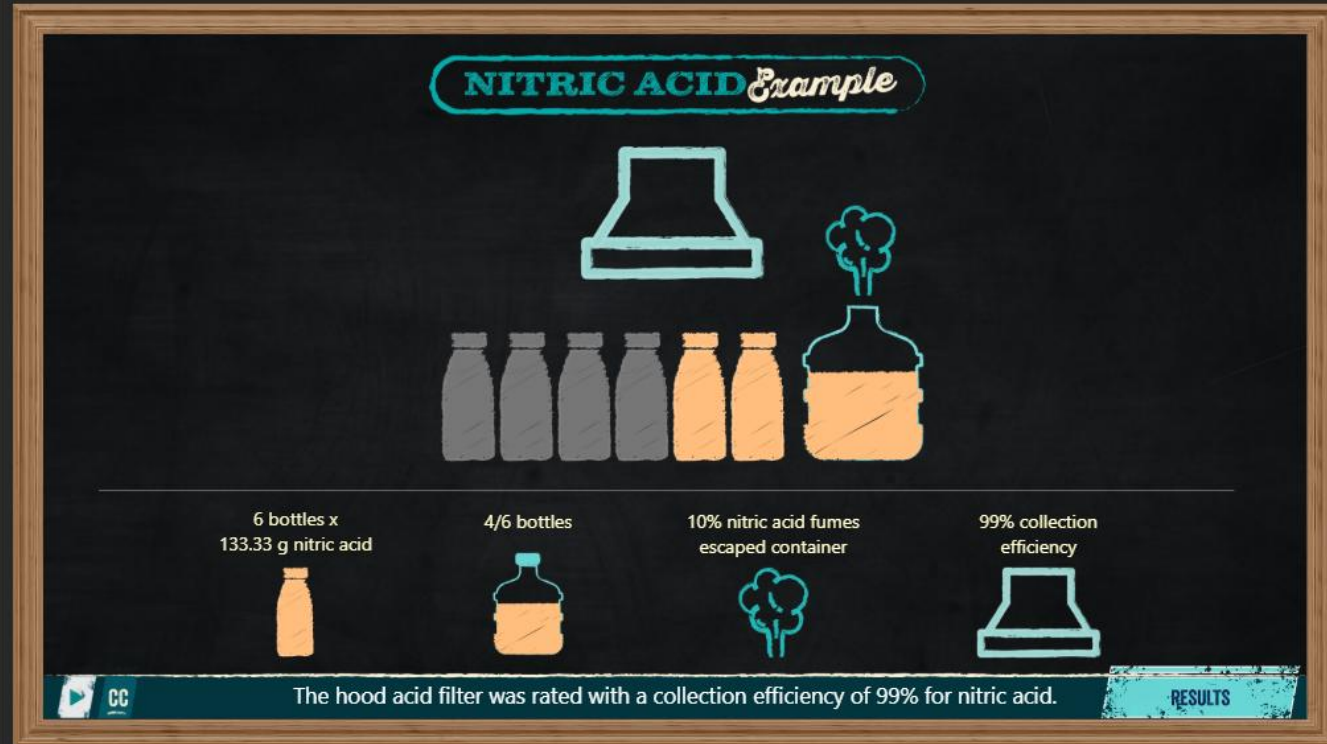
Practical Application

Learning Strategy

Process modeling, sequential visualization

Interactive Elements

Click and reveal (spin)



Practical Application

Learning Strategy

- Process modeling
- Sequential visualization
- Stepwise scaffolding

Interactive Elements

- Animated timeline
- Clickable *Results* button

NITRIC ACID *Example*

$$ST = (MAR)(DR)(ARF)(RF)(LPF)$$

$$ST = (800 \text{ g})(0.67)(0.10)(1.0)(0.01)$$

$$ST = \mathbf{0.54 \text{ g}}$$

6 bottles x
133.33 g nitric acid



800 g nitric acid

4/6 bottles



4/6 = 0.67

10% nitric acid fumes
escaped container



53.30 g = 10%

100% respirable
acid vapor



100% or 1.0

1% fumes escape
exhaust stack



1% or 0.01

So, our final source term would be 0.54 grams.

TEST YOUR KNOWLEDGE

Practical Application

Learning Strategy

- Cognitive chunking
- Sequential visualization
- Stepwise scaffolding

Interactive Elements

- Animated timeline progression
- Clickable *Test Your Knowledge* button

NITRIC ACID *Example*

How much material is available to be damaged or released before we apply other factors?

$ST = (MAR)(DR)(ARF)(RF)(LPF)$
 $ST = (?)$

Select the correct answer.

- ☐ 4/6 bottles = 0.67
- ☒ 1% fumes escape exhaust stack to atmosphere
- ☐ 100% released fumes is respirable
- ☐ 10% (or 53.30 g) fumes released into the atmosphere
- ☐ 800 g (or 133.33 g/bottle) of nitric acid

SUBMIT

Knowledge Check

Learning Strategy
Applied assessment

Interactive Elements

- Question prompt
- Clickable multiple-choice buttons

NITRIC ACID *Example*

How much material is available to be damaged or released before we apply other factors?

ST = (MAR)(DR)(ARF)(RF)(LPF)

ST = (?)

TRY AGAIN

Not quite.
You'll need to try again.

REVISIT EXAMPLE

CONTINUE

Select the correct answer.

- ☐ 4/6 bottles = 0.67
- ☒ 1% fumes escape exhaust stack to atmosphere
- ☐ 100% released fumes is respirable
- ☐ 10% (or 53.30 g) fumes released into the atmosphere
- ☐ 800 g (or 133.33 g/bottle) of nitric acid

Knowledge Check

Learning Strategy

Immediate feedback, feedback loop

Interactive Elements

Clickable buttons

NITRIC ACID Example

How much material is available to be damaged or released before we apply other factors?

ST = (MAR)(DR)(ARF)(RF)(LPF)

ST = (?)

Select the correct answer.

- ☐ 4/6 bottles = 0.67
- ☐ 1% fumes escape exhaust stack to atmosphere
- ☐ 100% released fumes is respirable
- ☐ 10% (or 53.30 g) fumes released into the atmosphere
- ☒ 800 g (or 133.33 g/bottle) of nitric acid

SUBMIT

Knowledge Check

Learning Strategy

Reinforcement via reattempt

Interactive Elements

Clickable multiple-choice buttons

NITRIC ACID *Example*

How much material is available to be damaged or released before we apply other factors?

ST = (MAR)(DR)(ARF)(RF)(LPF)

ST = (800 g)

CORRECT

The material at risk is 800 grams of nitric acid, or six bottles containing 133.33 grams per bottle.

CONTINUE

Select the correct answer.

- ☐ 4/6 bottles = 0.67
- ☐ 1% fumes escape exhaust stack to atmosphere
- ☐ 100% released fumes is respirable
- ☐ 10% (or 53.30 g) fumes released into the atmosphere
- ☒ 800 g (or 133.33 g/bottle) of nitric acid

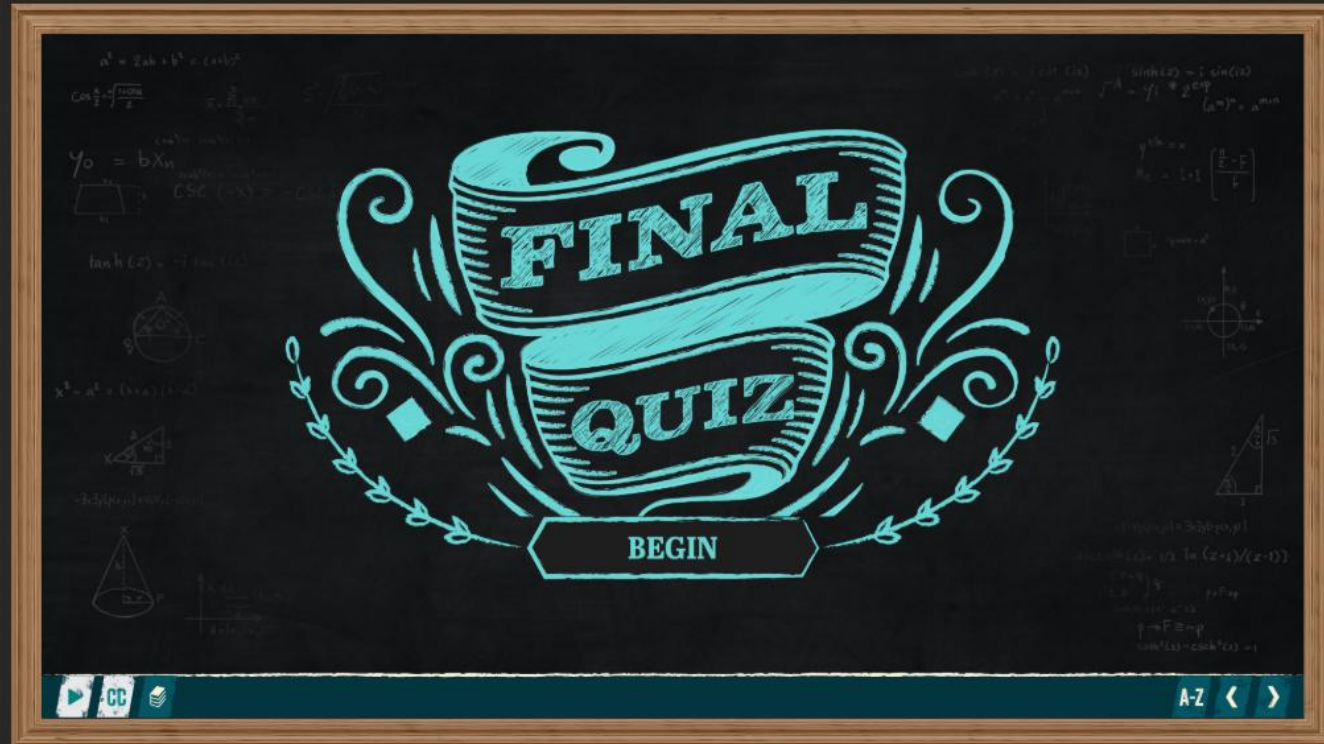
Knowledge Check

Learning Strategy

Immediate feedback, reinforcement

Interactive Elements

Results reveal



Final Quiz

Learning Strategy

Immediate feedback, reinforcement

QUESTION 1 OF 20

How do we define source term?

Select the correct answer.

- ☐ How much material is available to be damaged or released.
- ☒ How well the airborne material can be confined.
- ☐ A way to describe the quantity of hazardous material released to the atmosphere for atmospheric dispersion modeling.
- ☐ The amount of material that is finely divided enough to be inhaled.

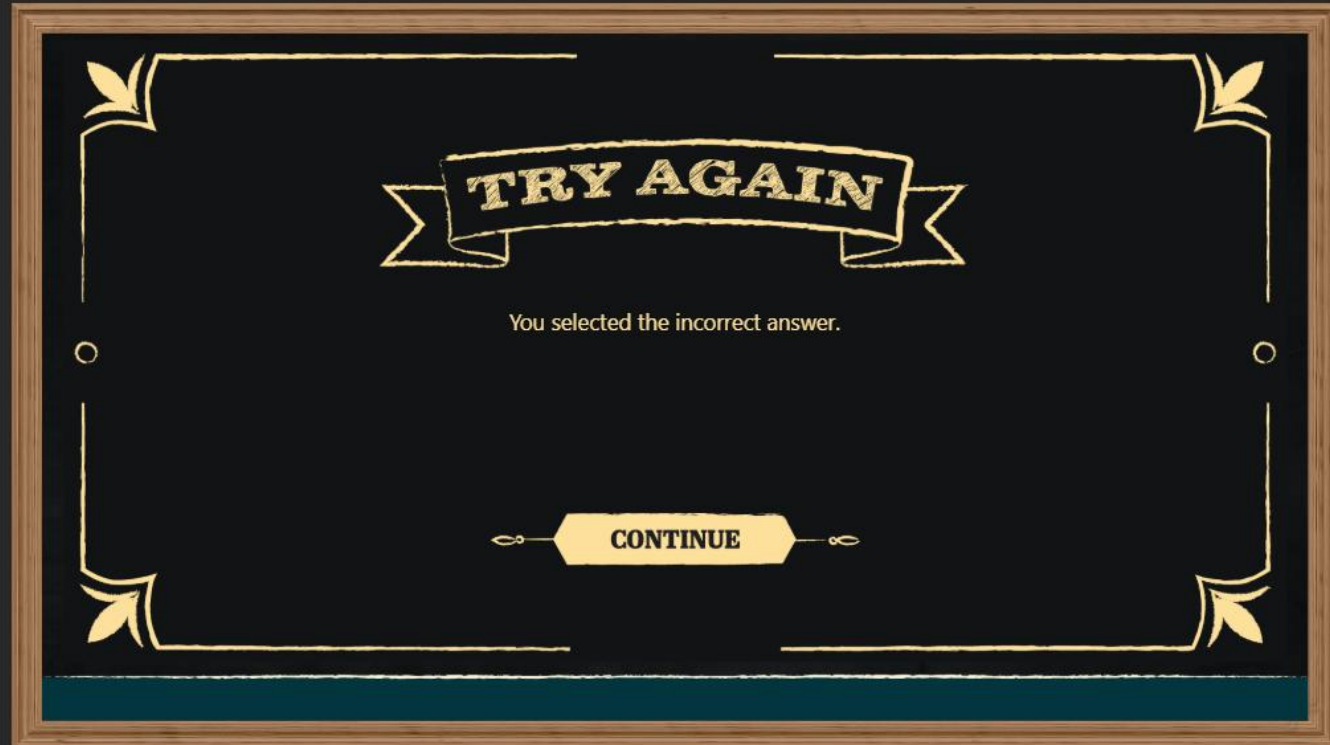
SUBMIT

Final Quiz

Learning Strategy
Applied assessment

Interactive Elements

- Question prompt
- Clickable multiple-choice buttons



Final Quiz

Learning Strategy

Immediate feedback, reinforcement

Interactive Elements

Clickable button

QUESTION 1 OF 20

How do we define source term?

Select the correct answer.

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- ☐ How well the airborne material can be confined.
- ☒ A way to describe the quantity of hazardous material released to the atmosphere for atmospheric dispersion modeling.
- ☐ The amount of material that is finely divided enough to be inhaled.

SUBMIT

Final Quiz

Learning Strategy

Reinforcement via reattempt

Interactive Elements

- Question prompt
- Clickable multiple-choice buttons

INCORRECT

You selected the incorrect answer.

Source term is defined as a way to describe the quantity of hazardous material released to the atmosphere for atmospheric dispersion modeling.

CONTINUE

Final Quiz

Learning Strategy

Immediate feedback, reinforcement

Interactive Elements

Clickable button



Quiz Results Fail

Learning Strategy

- Summative assessment with corrective feedback
- Learners are encouraged to revisit content

Interactive Elements

- Automated score calculation
- Conditional feedback layer (fail state)
- Navigation button to retry quiz



Quiz Results Pass

Learning Strategy

- Confirms learner comprehension
- Positive reinforcement – acknowledges successful completion

Interactive Elements

- Automated score calculation
- Conditional feedback layer (pass state)
- Navigation button to continue to end of course



Congratulations Exit Slide

Learning Strategy

- Course closer
- Learner autonomy – provides clear direction for next steps

Interactive Elements

Exit button

GLOSSARY

Select each link below.

✓ A-B

HEPA

High Efficiency Particulate Air: the HEPA filter is a type of pleated mechanical air filter. This type of air filter can theoretically remove at least 99.97% of dust, pollen, mold, bacteria, and any airborne particles with a size of 0.3 microns (μm).

✓ C-E

✓ F-M

N-Z

HotSpot Model

The HotSpot atmospheric dispersion models are designed for near-surface releases, short-range dispersion, and short-term release durations in unobstructed terrain and simple meteorological conditions.

LPF

Leak Path Factor: the fraction of airborne materials transported from containment or confinement deposition or filtration mechanism (e.g., fraction of airborne material in a glovebox leaving the glovebox under static conditions, fraction of material passing through a HEPA filter).

MAR

Material-at-Risk: the amount of material available to be acted on by a given physical stress.

BACK

Glossary

Learning Strategy

- Just in time learning support
- Terminology reinforcement
- Reference based scaffolding – supports learner who need conceptual clarity

Interactive Elements

- Click and reveal glossary navigation
- Navigation back to main content

RESOURCES

Select each link below.

- ✓ **DOE-HDBK-3010-94 Volume I (Reaffirmed 2013)**, *Airborne Release Fractions/Rates and Respirable Fractions for Nonreactor Nuclear Facilities, Volume I, Analysis of Experimental Data (Part 1 of 2, links to all Parts)*
- ✓ **DOE-STD-1027-2018 Chg Notice 1**, *Hazard Categorization of DOE Nuclear Facilities*
- ✓ **DOE-HDBK-1224-2024**, *Hazard and Accident Analysis Handbook*
- ✓ **DOE-STD-5506-2021**, *Preparation of Safety Basis Documents for Transuranic (TRU) Waste Facilities*
- EPA 550-B-99-009 (March 2009)**, *Risk Management Program Guidance of Offsite Consequence Analysis*
- ✓ **NUREG-1140**, *A Regulatory Analysis on Emergency Preparedness for Fuel Cycle and Other Radioactive Material Licensees: Final Report*
- DOE O 151.1E**, *Comprehensive Emergency Management System*

BACK

Resources

Learning Strategy

- Extended learning – encourages deeper exploration beyond the module
- Self-directed study
- Supportive scaffolding – offers credible external references

Interactive Elements

- Clickable external links
- Navigation back to main content