

CAMEOfm EXERCISES

CAMEOfm—CHEMICAL LIBRARY

1. Open the Chemical Library
2. Find the following chemical information:

Chemical Name : VX

CAS # : _____

UN/NA# : _____

NFPA RATINGS:

FIRE : _____

HEALTH : _____

REACTIVE : _____

SPECIAL : _____

IDLH : _____

ERPG -2 : _____

TEEL-2 : _____

OTHER INFO: _____

Chemical Name : starts with PHOS

CAS # : _____

UN/NA# : _____

NFPA RATINGS:

FIRE : 4

HEALTH : 4

REACTIVE : 2

SPECIAL : _____

IDLH : _____

ERPG -2 : _____

TEEL-2 : _____

OTHER INFO: is a gas at normal temperatures

ALOHA EXERCISE

An 8,000 gallon tanker truck carrying 70% Nitric Acid developed a major leak while traveling through your “downtown” area on a major roadway (Interstate, U.S. Highway, or State Highway). The tank is approximately 30’ long and has 2” valves. The leak continued over a 3 mile section of the roadway before it was discovered. The truck is now stopped at a rest area, and the tank is still leaking. The leak is supposed to be from a 2” valve on the bottom of the truck. The truck is stopped on a nearly level paved parking lot, and a puddle of product has formed estimated to be about 30’ x 30’. The driver estimates the release began 25 minutes ago, and that he has been stopped for 10 minutes.

Question: Is it possible to “model” a release along the 3-mile section of highway? What CAMEO Suite “tool” could you use to do that?

Question: Can you “estimate” the amount of product released over the 3-mile section of highway? What “tool” could you use to produce that information?

Question: Can you “model” the incident at the point where the truck has stopped? What distance is the potential threat zone? How long will it take the tank to empty?

Question: Can you use the NOAA Evaporation Calculator for this incident? Why or why not?

ANSWERS

CAMEO answers

Chemical Name : PHOSPHONOTHIOIC ACID,
METHYL-, S-(2-(BIS(1-
METHYLETHYL)AMINO)ETHY)
O-ETHYL ESTER

CAS # : 0782-69-9

UN/NA# : NONE

NFPA RATINGS:

FIRE : BLANK
HEALTH : BLANK
REACTIVE : BLANK
SPECIAL : BLANK

IDLH : BLANK

ERPG -2 : blank

TEEL-2 : 0.002 mg/m³; a very small amount!

OTHER INFO:

Chemical Name : Phosphine

CAS # : 7803-51-2

UN/NA# : 2199

NFPA RATINGS:

FIRE : 4
HEALTH : 4
REACTIVE : 2
SPECIAL : blank

IDLH : 50 ppm

ERPG -2 : 0.5 ppm

TEEL-2 : blank

ALOHA answers

Answer 1: You could use a Screenings and Scenarios to model the release along the roadway. There are some requirements.

1. You must have a CAMEOfm Routes record for the roadway.
2. That record must have Nitric Acid in its Chemical Inventory.
3. The Chemical Inventory record must have a number in the Max Amount is Largest Container field.
4. The CAMEOfm Route record must be linked to a MARPLOT Map.
5. The resulting threat zone distance estimation must not exceed 10 miles.

Answer 2: ALOHA Tank Source will produce a “Max Average Sustained Release Rate” given in pounds/minute. Using the information given in the exercise, my estimate was 139 pounds/minute. If the driver is correct that the release along the roadway was 15 minutes in duration, the amount of product spilled along the roadway is $139 * 15 = 2085$ pounds. You could now go back to Scenarios and use the 2085 pounds as your release amount. After running the Scenario, use the “Show On Map” button to view the threat zone on the MARPLOT map (this works ONLY if the Routes record is linked to a MARPLOT road segment).

Answer 3. At this point, you could use either the Tank or Puddle Source option in ALOHA to model the release. Either method will require some estimations on your part. I would probably do both and compare the results, hoping they would be similar. ALOHA Source Strength will limit the output to 1 hour; however, you can use the 139 pounds/minute to compute an estimate for the amount of time necessary for the tank to empty.

Example:

ATMOSPHERIC INFORMATION: (MANUAL INPUT OF DATA)

Wind: 10 mph from s at 3 meters

No Inversion Height

Stability Class: D Air Temperature: 85° F

Relative Humidity: 50% Ground Roughness: open country

Cloud Cover: 5 tenths

Tank Capacity: 8000 gallons

Tank Length: 30 feet

Tank Diameter: 6.74 feet (computed by ALOHA)

Tank contains Liquid at Ambient Temperature

Tank was 100% full at incident beginning; however, 2085 pounds have already been spilled along the roadway. Therefore, the nitric remaining in the tank at the time it stopped is:

Nitric Acid weights about 10 lbs/gal (from RIDS General Description)

Released along roadway is 2085 lbs, or 285 gal

8000 gal - 285 gal = 7715 gal remaining in tank

7715 gal = 77150 lbs

average release rate (from ALOHA) is 139 lbs / minute

therefore: $77150 / 139 = 555$ minutes or about 9.5 hours

The Maximum Footprint Distance is 635 yards from the stopped truck point.

Using a Puddle Source with 200 gallons in the puddle and 900 square feet puddle size results in:

SOURCE STRENGTH INFORMATION:

Puddle Area: 1000 square feet

Puddle Volume: 250 gallons
Soil Type: Concrete Ground Temperature: 85° F
Initial Puddle Temperature: Ground temperature
Release Duration: ALOHA limited the duration to 1 hour
Max Computed Release Rate: 29.4 pounds/min
Max Average Sustained Release Rate: 29.4 pounds/min
(averaged over a minute or more)
Total Amount Released: 1,270 pounds

FOOTPRINT INFORMATION:

Dispersion Module: Gaussian
User-specified LOC: equals IDLH (25 ppm)
Max Threat Zone for LOC: 269 yards

Answer 4: Yes you can use the NOAA Evaporation Calculator. Entering information from above results in predicted release rate of 28.1 lbs/minutes, which is very close to the ALOHA Puddle prediction of 29.4 lbs/minute.

Plugging 28.1 lbs/minute into ALOHA Direct / Continuous results in the following:

SOURCE STRENGTH INFORMATION:

Direct Source: 28.1 pounds/min
Source Height: 0
Release Duration: 60 minutes
Release Rate: 28.1 pounds/min
Total Amount Released: 1,686 pounds

FOOTPRINT INFORMATION:

Model Run: Heavy Gas
User-specified LOC: equals IDLH (25 ppm)
Max Threat Zone for LOC: 407 yards