

CAMEO Refresher Exercise Set: July, 2010

CAMEO and Reactive Chemicals: Transportation Incident

Scenario:

A 1-ton cargo truck has overturned on a local roadway. Local responders have secured the immediate area, and have obtained the shipping manifest from the vehicle cab. The manifest lists the following materials on-board:

Hydrochloric Acid
Nitric Acid
Caustic Soda
Potassium Hydroxide
Acetic Acid (Glacial)

There are four 55-gallon drums and approximately 100 paper sacks strewn about the area. At present, none of the drums appear to be leaking product. The ground is covered with what appears to be a white, powdery substance coming from several of the paper sacks.

You are directed to operate CAMEO and supply information to Incident Command for the duration of this event.

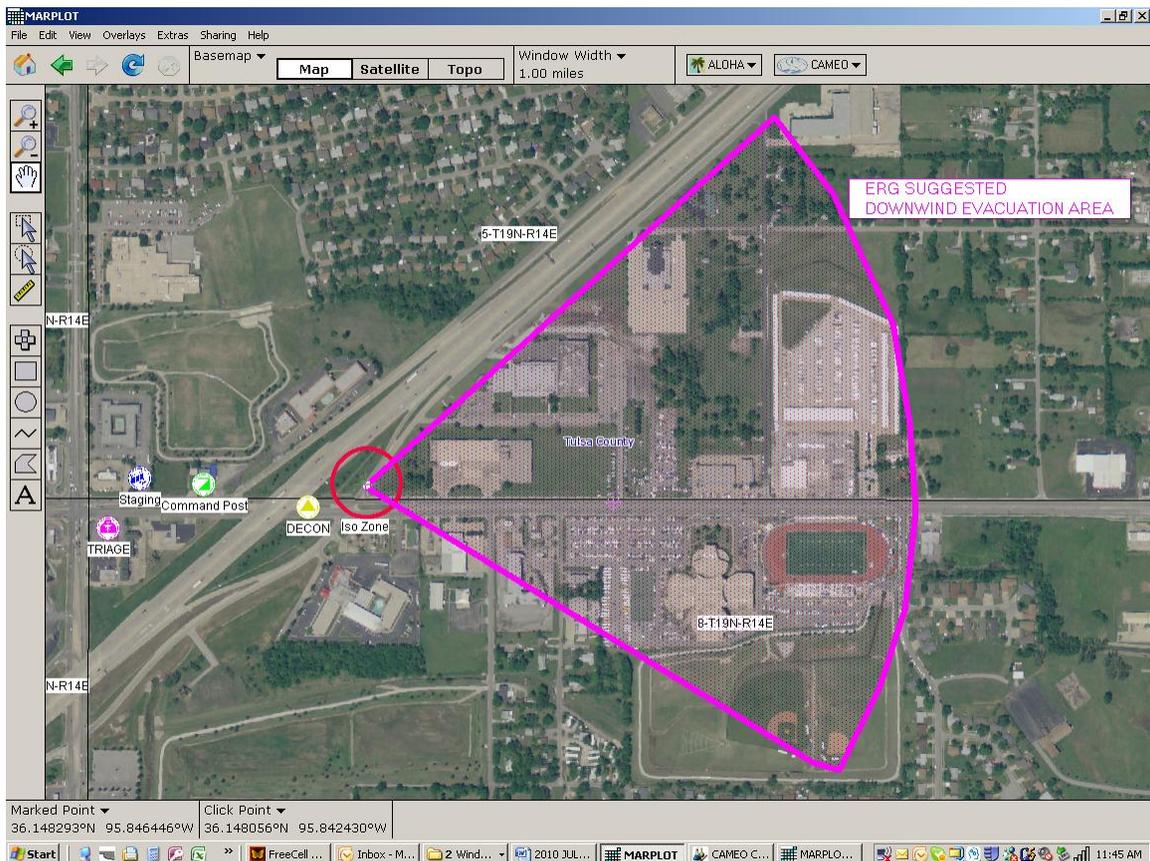
CAMEO Chemicals

1. Use CAMEO Chemicals to gather information for the various chemicals. (CAMEO Companion pages 31-34)
 - a. Which listed products are likely contained in the 55-gallon drums?
 - b. Which listed products are likely contained in the paper sacks?
 - c. Which product(s) are the white powder on the ground?
 - d. Which products represent the greatest threat to the first responders?
 - e. Based on this information, what would you recommend as the Immediate Isolation Zone distance?
 - f. Based on this information, what would you recommend as the Downwind Evacuation distance?
 - g. Based on the information, what level of protection would you recommend for entry into the Hot Zone?

2. Use the CAMEO Chemicals “Predict Reactivity” module to evaluate the potential reactive hazards for this incident. (CAMEO Companion pages 34-35)
 - a. Add each of the listed materials to the CAMEO Chemicals “My Chemicals” list
 - b. Use the CAMEO Chemicals “Predict Reactivity” module to evaluate the reactive possibilities.
 - c. What is the “Summary of all possible reactions”?

MARPLOT

1. Launch MARPLOT
2. Select a location in your area to use as the incident site
3. Navigate to the incident location (CAMEO Companion pages 57-62)
4. Mark the incident location using the “Extras / Marked Point / Mark Click Point” menu (CAMEO Companion pages 65-66)
5. Use the “Circle” drawing tool to display the Immediate Isolation Zone on the map (CAMEO Companion pages 74, 81)
6. Use the “Symbol” drawing tool to display the Command Post, Staging Area, Triage, and Decon points. (CAMEO Companion pages 74-80)
7. Use the “Polygon” drawing tool to display the ERG-suggestion downwind evacuation area
8. Copy and paste a screenshot of the mapped area from MARPLOT to WORD. (CAMEO Companion pages 85)



HYDROCHLORIC ACID: 42% USING "PUDDLE" SOURCE

Chemical Information

View: Pure Chemicals
 Solutions

AQUEOUS AMMONIA
HYDROCHLORIC ACID
HYDROFLUORIC ACID
NITRIC ACID
OLEUM

Select

Cancel

Solution Strength: % (by Weight)

The percentage of hydrogen chloride in solution. Allowable range is 20 to 42 percent.

Help

Assume the following weather data:

ATMOSPHERIC DATA: (MANUAL INPUT OF DATA)

Wind: 12 miles/hour from w at 3 meters

Ground Roughness: urban or forest

Air Temperature: 82° F

No Inversion Height

Cloud Cover: 5 tenths

Stability Class: D

Relative Humidity: 65%

Assume the following Source data:

SOURCE STRENGTH:

Evaporating Puddle

Puddle Area: 400 square feet Puddle Volume: 55 gallons

Ground Type: Default soil Ground Temperature: 82° F

Initial Puddle Temperature: 68.9° F

Release Duration: ALOHA limited the duration to 1 hour

Max Average Sustained Release Rate: 35.9 pounds/min
(averaged over a minute or more)

Total Amount Hazardous Component Released: 130 pounds

Puddle Input

Puddle area is: square feet
 diameter yards
 meters

Select one and enter appropriate data

Volume of puddle
 Average depth of puddle
 Mass of puddle

Volume is: gallons liters
 cubic feet cubic meters

Ground Type, Ground and Puddle Temperature

Select ground type

Default soil [select this if unknown]
 Concrete
 Sandy dry soil
 Moist sandy soil
 Water [ALOHA does not model solutions on water]

Input ground temperature

Use air temperature [select this if unknown]
 Ground temperature is F C

Input initial puddle temperature

Use ground temperature [select this if unknown]
 Use air temperature
 Initial puddle temperature is F C

Assume the following Threat Zone data:

Toxic Level of Concern

Select Toxic Level of Concern:

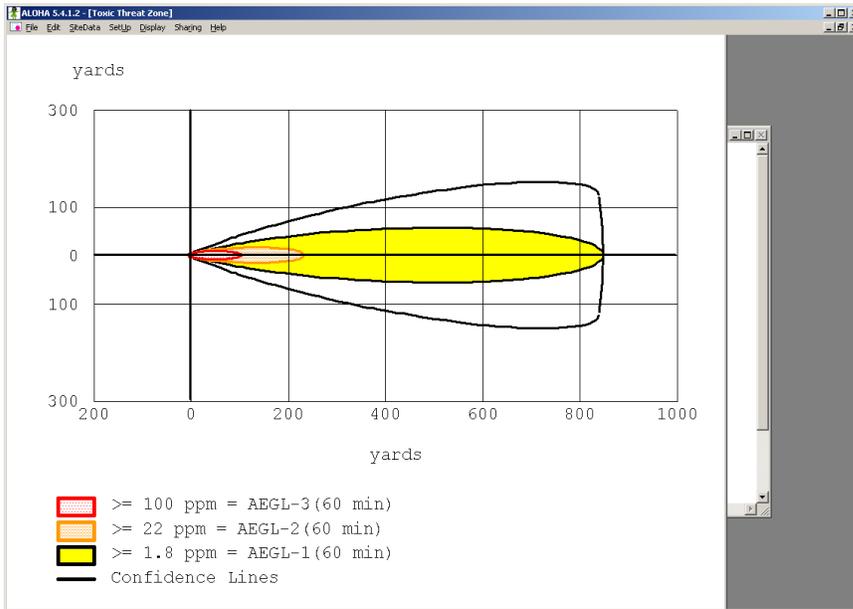
Red Threat Zone
LOC: **AEGL-3(60 min): 100 ppm**

Orange Threat Zone
LOC: **AEGL-2(60 min): 22 ppm**

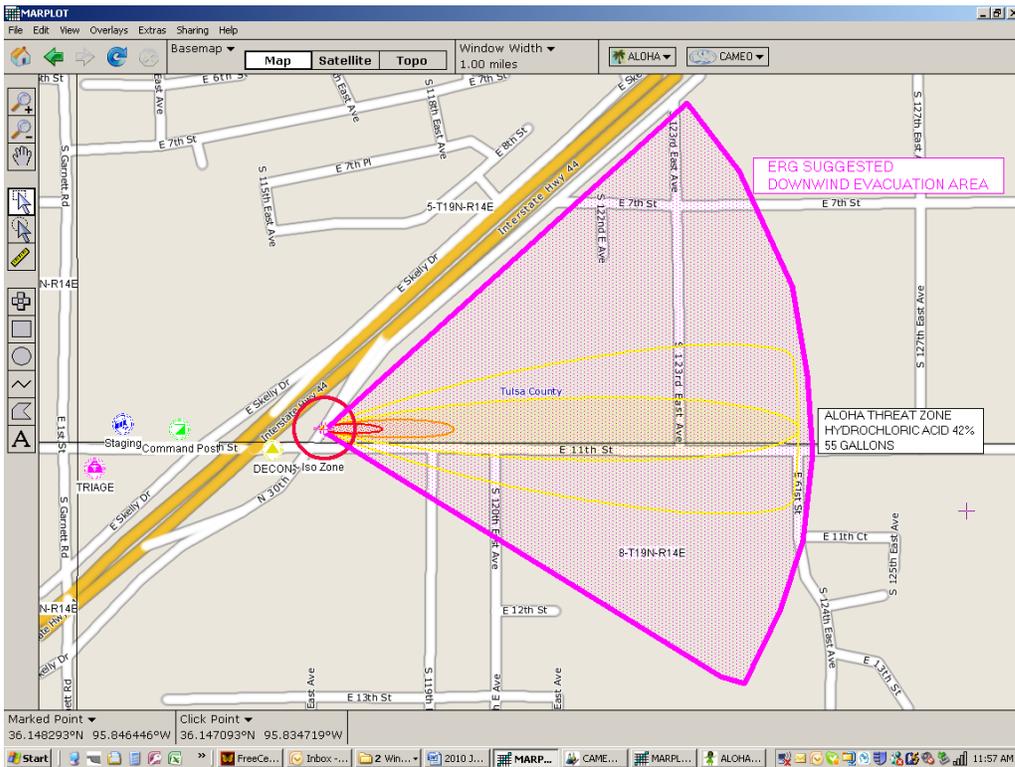
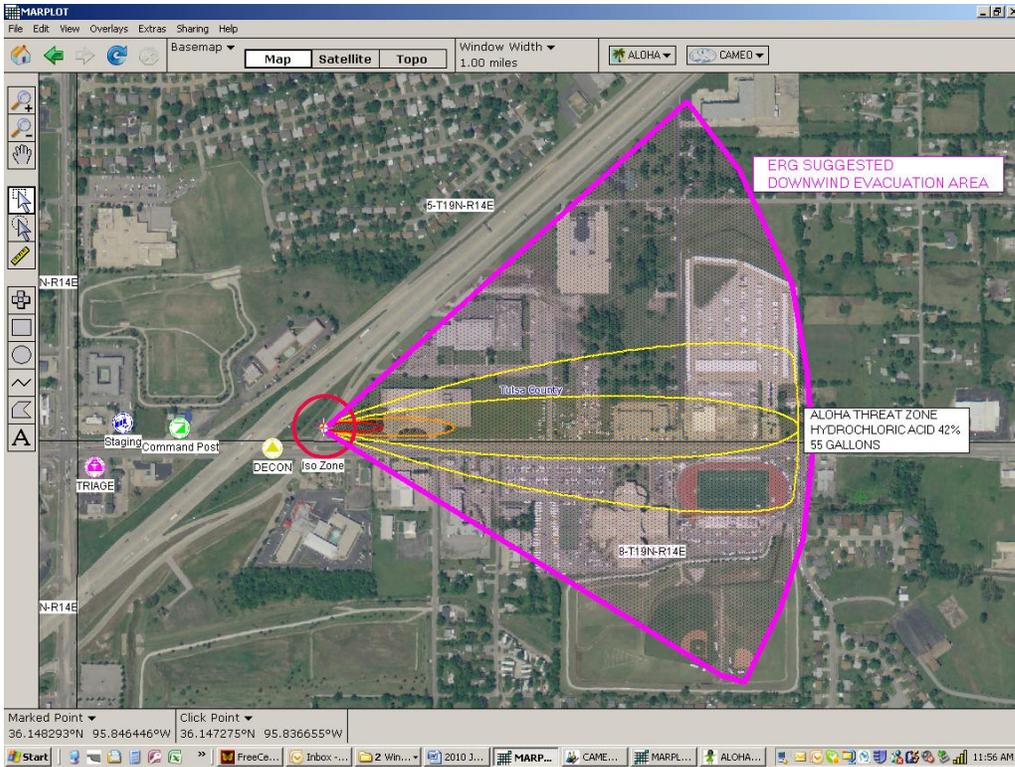
Yellow Threat Zone
LOC: **AEGL-1(60 min): 1.8 ppm**

Show confidence lines:
 only for longest threat zone
 for each threat zone

OK Cancel Help



Note: your ALOHA Threat Zone will be different than the one shown above because of time of day and location differences. The Threat Zone shown above is for Oklahoma City on June 29, 2010 1105 hours CDT.



Note: your ALOHA Threat Zone will be different than the one shown above because of time of day and location differences. The Threat Zone shown above is for Oklahoma City on June 29, 2010 1105 hours CDT.

NITRIC ACID: 70% USING "PUDDLE" SOURCE

Chemical Information

View: Pure Chemicals
 Solutions

AQUEOUS AMMONIA
HYDROCHLORIC ACID
HYDROFLUORIC ACID
NITRIC ACID
OLEUM

Select
Cancel

Solution Strength: % (by Weight)

The percentage of HNO₃ in solution. Allowable range is 69 to 99 percent.

Help

Use the same Weather Conditions and Puddle Source model as for the Hydrochloric Acid.

ATMOSPHERIC DATA: (MANUAL INPUT OF DATA)

Wind: 12 miles/hour from w at 3 meters
Ground Roughness: urban or forest Cloud Cover: 5 tenths
Air Temperature: 82° F Stability Class: D
No Inversion Height Relative Humidity: 65%

SOURCE STRENGTH:

Evaporating Puddle
Puddle Area: 400 square feet Puddle Volume: 55 gallons
Ground Type: Default soil Ground Temperature: 82° F
Initial Puddle Temperature: Ground temperature
Release Duration: ALOHA limited the duration to 1 hour
Max Average Sustained Release Rate: 1.09 pounds/min
(averaged over a minute or more)
Total Amount Hazardous Component Released: 62.8 pounds

NITRIC ACID: 70% THREAT ZONE

THREAT ZONE:

Model Run: Gaussian

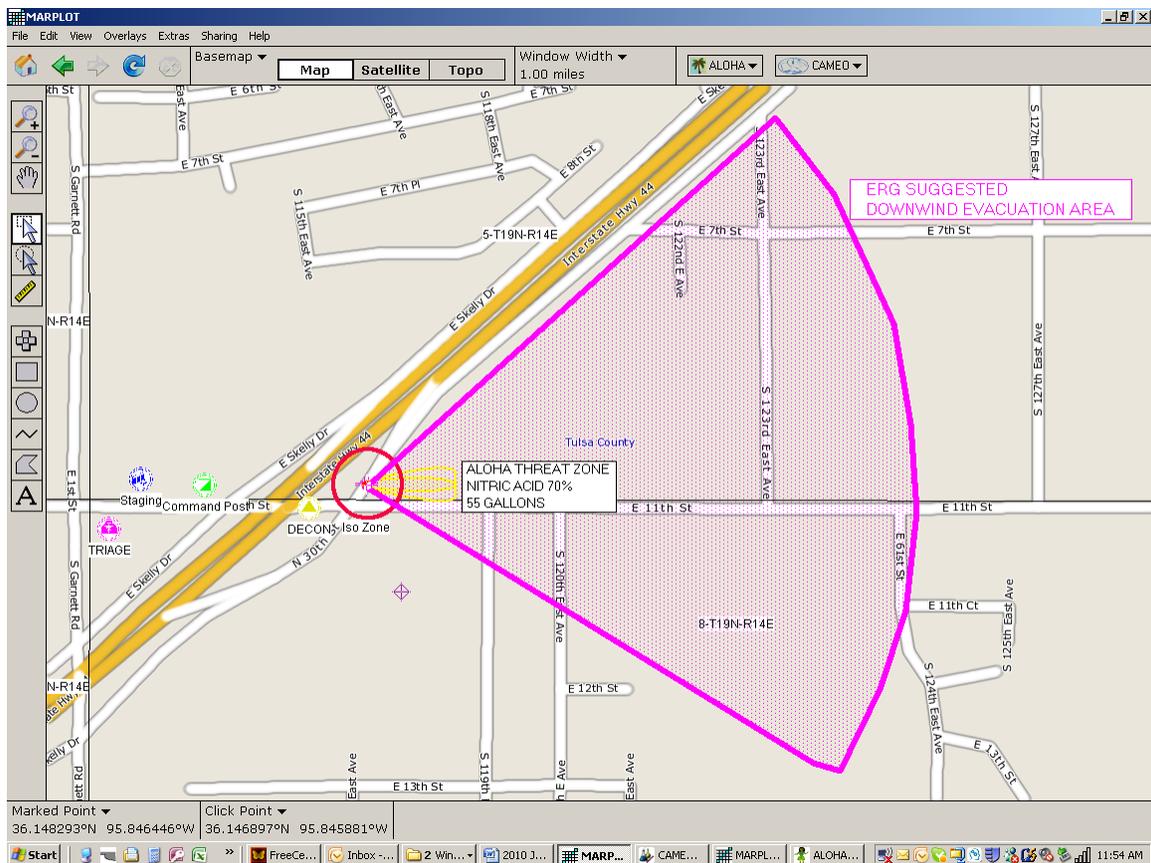
Red : less than 10 meters(10.9 yards) --- (78 ppm = ERPG-3)

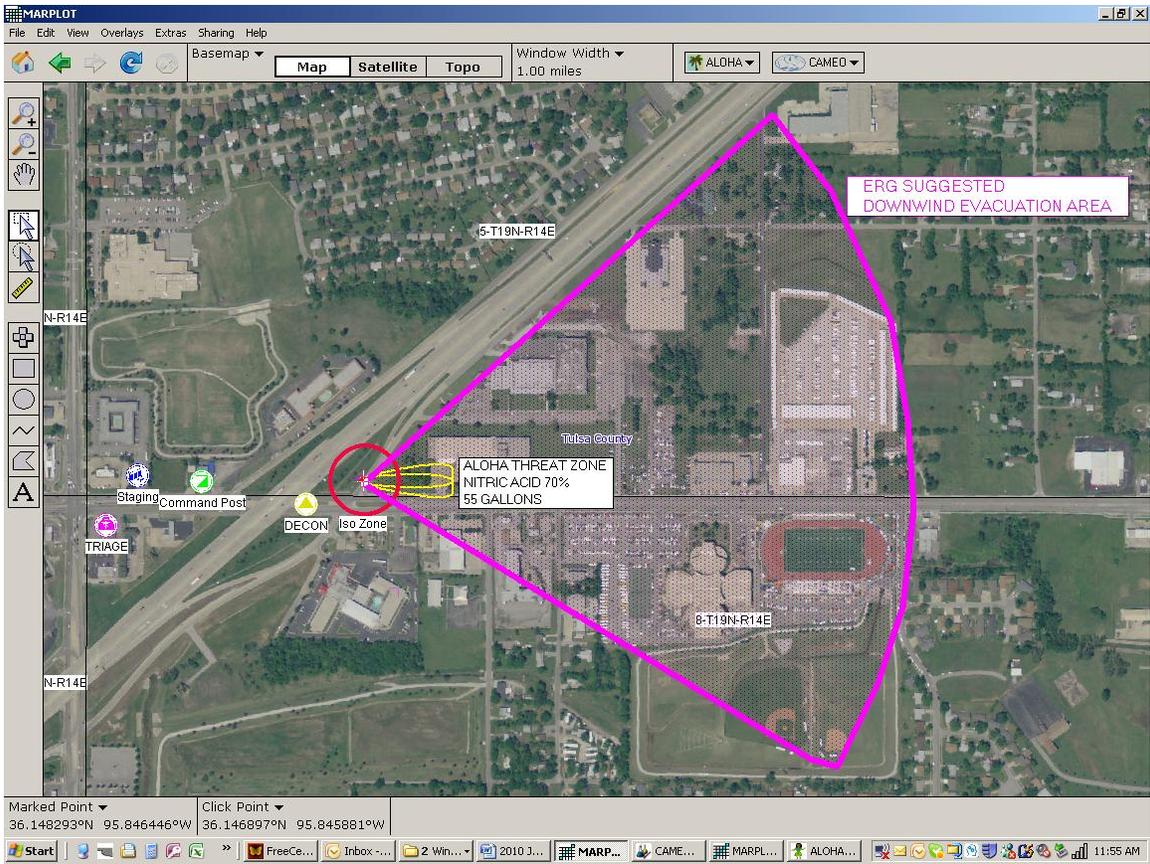
Note: Threat zone was not drawn because effects of near-field patchiness make dispersion predictions less reliable for short distances.

Orange: 54 yards --- (6 ppm = ERPG-2)

Note: Threat zone was not drawn because effects of near-field patchiness make dispersion predictions less reliable for short distances.

Yellow: 143 yards --- (1 ppm = ERPG-1)





Note: your ALOHA Threat Zone will be different than the one shown above because of time of day and location differences. The Threat Zone shown above is for Oklahoma City on June 29, 2010 1105 hours CDT.

ANSWERS:

CAMEO Chemicals

Use CAMEO Chemicals to gather information for the various chemicals. (CAMEO Companion pages 31-34)

- a. Which listed products are likely contained in the 55-gallon drums?
Hydrochloric, Nitric, and Acetic acids
- b. Which listed products are likely contained in the paper sacks?
Caustic Soda, Potassium Hydroxide
- c. Which product(s) are the white powder on the ground?
Caustic Soda, Potassium Hydroxide
- d. Which products represent the greatest threat to the first responders?
Hydrochloric Acid, Nitric Acid
- e. Based on this information, what would you recommend as the Immediate Isolation Zone distance?
The ERG suggests 50 meters or 150 feet for both the Nitric Acid, other than red fuming; and the Hydrochloric Acid, Solution
- f. Based on this information, what would you recommend as the Downwind Evacuation distance?
ERG Guide 157 suggests an 800 meter or ½ mile evacuation area.
- g. Based on the information, what level of protection would you recommend for entry into the Hot Zone?
Since both the Hydrochloric and the Nitric are Inhalation Hazards, Level A is the most appropriate choice. However, since no “acid” appears to be leaking at present, responders could enter the Hot Zone in Level B.

Use the CAMEO Chemicals “Predict Reactivity” module to evaluate the potential reactive hazards for this incident. (CAMEO Companion pages 34-35)

- a. Add each of the listed materials to the CAMEO Chemicals “My Chemicals” list

The screenshot shows the CAMEO Chemicals software interface. The window title is "CAMEO Chemicals". The menu bar includes "File", "Navigate", "Sharing", and "Help". Below the menu bar, there are navigation icons and dropdown menus for "ALPHA" and "CAMEO". The main content area has a blue header with the "CAMEO Chemicals" logo. On the left, there is a sidebar with navigation options: "Home", "Help", "Search Chemicals" (with sub-options: "New Search", "Modify Search", "Search Results"), "MyChemicals" (with sub-options: "chemicals: 5", "View MyChemicals", "Predict Reactivity"). The main content area is titled "MyChemicals" and contains a "MyChemicals Collection" with five items:

1. [HYDROCHLORIC ACID, SOLUTION](#)
2. [NITRIC ACID, OTHER THAN RED FUMING](#)
3. [CAUSTIC SODA, BEAD](#)
4. [POTASSIUM HYDROXIDE, \[DRY SOLID, FLAKE, BEAD, OR GRANULAR\]](#)
5. [ACETIC ACID, GLACIAL](#)

Below the list are buttons for "Add Water" and "Add Reactive Group". A link says "Accidentally removed a chemical? [Retrieve it here.](#)".

Use the MyChemicals Collection to...

- View **chemical datasheets** (with response recommendations and chemical property information) and reactive group datasheets by clicking on the name of any substance in the list above.
- Consider the **reactivity predictions** if these substances were mixed together, by going to the [Reactivity](#) page. (For an overview of each chemical's reactive hazards (including air and water reactivity), click its name in the list above and review the Hazards section of the chemical datasheet.)
- Generate a **report** (with reactivity predictions and datasheet information) by clicking Print Report.

Saving MyChemicals Collections

Note: The MyChemicals collection will be cleared when you close your browser (or close the program in the downloadable version).

To save this collection for future reference, click Export to save a file to your computer that you can later import back into CAMEO Chemicals. The exported file only contains a list of substances that is used to re-create your MyChemicals collection; the actual datasheets aren't included. To create a report with datasheets, click the Print Report button above.

At the bottom of the window, the taskbar shows "Load complete" and various application icons. The system tray shows the time as 10:27 AM.

- b. Use the CAMEO Chemicals “Predict Reactivity” module to evaluate the reactive possibilities.

The screenshot displays the CAMEO Chemicals interface. The main content area is titled "Chemical Reactivity" and features a "Compatibility Chart". The chart is a grid where each cell lists the reactivity hazards for a specific pair of chemicals. The chemicals included in the chart are:

- HYDROCHLORIC ACID, SOLUTION
- NITRIC ACID, OTHER THAN RED FUMING
- CAUSTIC SODA, BEAD
- POTASSIUM HYDROXIDE, [DRY SOLID, FLAKE, BEAD, OR GRANULAR]
- ACETIC ACID, GLACIAL

The reactivity hazards listed in the cells include: Explosive, Flammable, Flammable gas, Heat generation, Intense reaction, Corrosive, and Toxic gas.

	HYDROCHLORIC ACID, SOLUTION			
NITRIC ACID, OTHER THAN RED FUMING	Explosive Flammable Flammable gas Heat generation Toxic gas	NITRIC ACID, OTHER THAN RED FUMING		
CAUSTIC SODA, BEAD	Corrosive Flammable Heat generation Intense reaction Toxic gas	Corrosive Explosive Flammable Heat generation Toxic gas	CAUSTIC SODA, BEAD	
POTASSIUM HYDROXIDE, [DRY SOLID, FLAKE, BEAD, OR GRANULAR]	Corrosive Flammable Heat generation Intense reaction Toxic gas	Corrosive Explosive Flammable Heat generation Toxic gas		POTASSIUM HYDROXIDE, [DRY SOLID, FLAKE, BEAD, OR GRANULAR]
ACETIC ACID, GLACIAL	Flammable gas Heat generation Toxic gas	Flammable Flammable gas Heat generation Toxic gas	Corrosive Flammable Heat generation Intense reaction Toxic gas	Corrosive Flammable Heat generation Intense reaction Toxic gas

c. What is the “Summary of Hazard Predictions?”

⚠ Summary of Hazard Predictions (if all substances mixed)

- ➔ Reaction proceeds with explosive violence and/or forms explosive products.
- ➔ Heat generated from chemical reaction may initiate explosion.
- ➔ May become highly flammable or may initiate a fire, especially if other combustible materials are present.
- ➔ Spontaneous ignition of reactants or products due to reaction heat.
- ➔ Combination liberates gaseous products, including both flammable and toxic gases. May cause pressurization.
- ➔ Exothermic reaction. May generate heat and/or cause pressurization.
- ➔ Exothermic, generation of toxic and corrosive fumes.
- ➔ Reaction may be intense or violent.