Exercise Answer

1. The following is a page from the *Incident Response Pocket Guide* (January 2010).

Safety Zones

A safety zone is an area where a firefighter can survive without a fire shelter. Considerations for effective safety zones:

- Take advantage of heat barriers such as lee side of ridges, large rocks, or solid structures.
- When possible, burn out safety zones prior to arrival of fire front.
- Avoid locations upslope or downwind from the fire; chimneys, saddles, or narrow canyons; and steep uphill escape routes.
- Not intended for structure protection.

Separation distance between the firefighter and the flames should be at least four times the maximum continuous flame height. Distance separation is the radius from the center of the safety zone to the nearest fuels.

Flame Height	Separation Distance (firefighters to flames)	Area in acres*
10 ft	40 ft	1/10 acre
20 ft	80 ft	1/2 acre
50 ft	200 ft	3 acres
100 ft	400 ft	12 acres
200 ft	800 ft	46 acres

*Area in acres is calculated to allow for distance separation on all sides for a 3-person engine crew (1 acre is approximately the size of a football field, or 208 feet by 208 feet).

Calculations are based on radiant heat only and do not account for convective heat from wind and/or terrain influences. Since calculations assume no wind and no slope, safety zones downwind or upslope from the fire may require larger separation distances.

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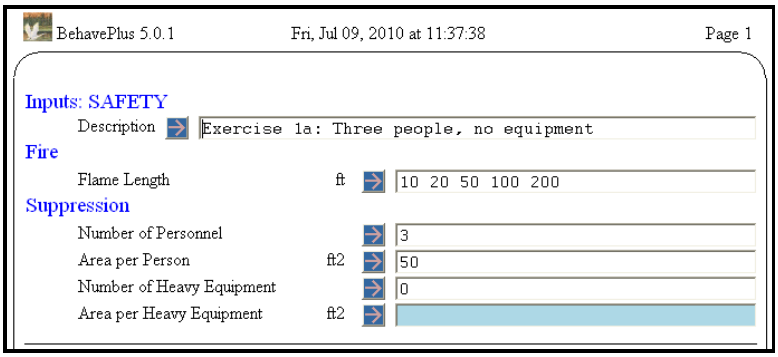
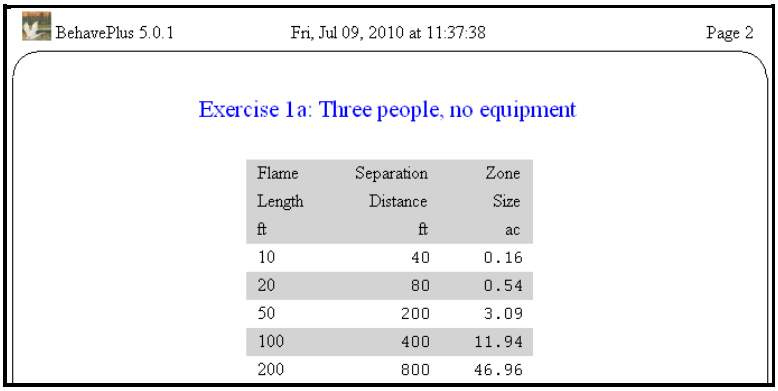
Compare BehavePlus calculations to those in the table. The table is for a "3-person engine crew." Is the Safety Zone Size calculated for the three people alone, or is the engine included in the safety zone? What are safety considerations of having the engine in the safety zone?

- Calculate Safety Zone Size for the three people and no heavy equipment.

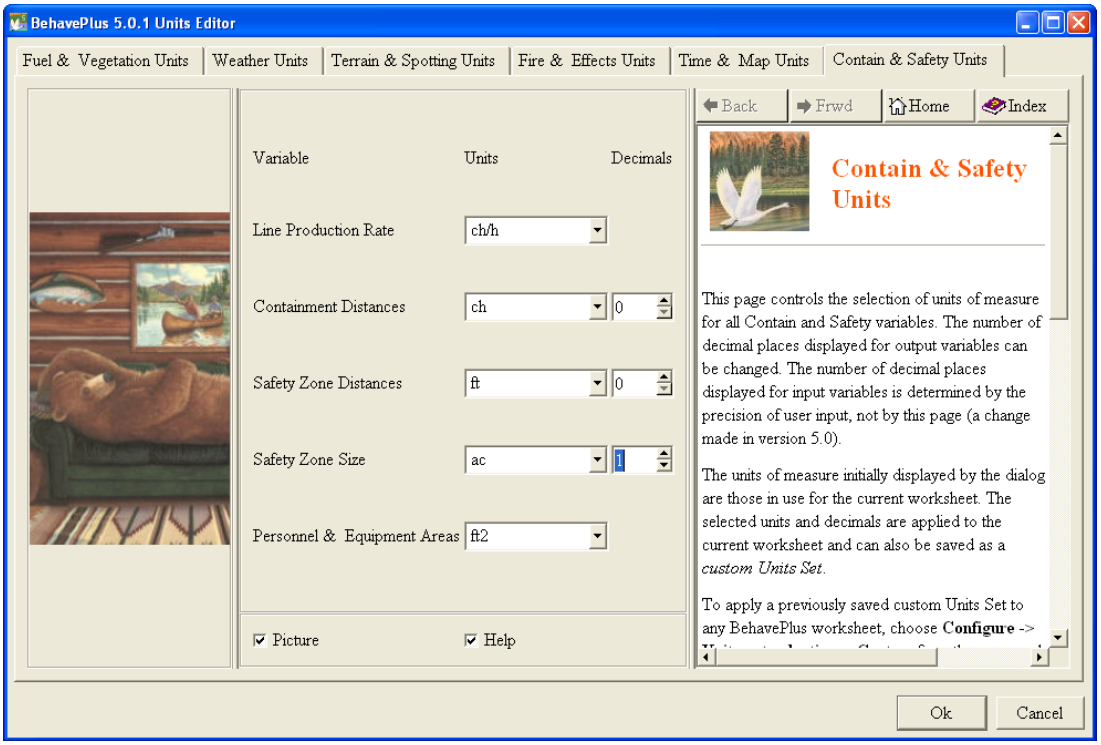




Flame Length ft	Separation Distance ft	Zone Size ac
10	40	0.16
20	80	0.54
50	200	3.09
100	400	11.94
200	800	46.96

Change the number of decimals displayed.

- Click on **Configure > Custom units preferences > Contain & Safety Units** tab.
- Change the number of decimal places for Safety Zone Size from 2 to 1.



- Click **Ok**.
- When asked **Save as Units Set File?** select **No**.

- Calculate the Run.

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Exercise 1a: Three people, no equipment

Flame Length ft	Separation Distance ft	Zone Size ac
10	40	0.2
20	80	0.5
50	200	3.1
100	400	11.9
200	800	47.0

The answers are similar to those in the IRPG. Remember that these are general guidelines and that the calculations are based on a circular safety zone.

- Now add the engine. Specify 300 ft^2 as the area required for it.
- Produce a table that compares the size with and without the engine.

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Inputs: SAFETY

Description: Exercise 1a: Three people, 1 equipment

Fire

Flame Length ft: 10 20 50 100 200

Suppression

Number of Personnel: 3

Area per Person ft2: 50

Number of Heavy Equipment: 0 1

Area per Heavy Equipment ft2: 300

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Exercise 1a: Three people, 1 equipment

Safety Zone Size (ac)

Flame Length ft	Number of Heavy Equipment 0	1
10	0.2	0.2
20	0.5	0.6
50	3.1	3.2
100	11.9	12.2
200	47.0	47.5

The size of the safety zone isn't much larger when including the engine. But there are important safety considerations for equipment in the safety zone. Note the comment in the **Help** window for Area per Heavy Equipment.