



## **INVESTIGATION GUIDELINE**

**Revised 2004  
Appendix 101**

### **PORTABLE LP GAS GRILLS**

#### **I. INTRODUCTION**

##### **A. Background**

With annual sales in the millions, there are more portable gas grills in use than all other major LP appliances combined. For many consumers, the outdoor gas grill that uses a twenty-pound LP gas cylinder represents their only LP or gas appliance. This lack of experience and limited knowledge with gas, especially LP gas, could lead to an increased risk of incidents associated with these products.

Commission staff will be reviewing applicable voluntary standards and industry practices that affect appliances utilizing twenty-pound cylinders. The staff believes that safe filling practices on small containers are not always followed. Lack of purging (removal of air) or over-filling has been known to occur. In 2002 the National LP-gas Code (NFPA 58) was modified to require that twenty-pound cylinders can not be filled unless they are equipped with an Overfill Prevention Device (OPD). Most local jurisdictions have adopted these requirements. The OPD is a float valve inside the cylinder that closes the fill inlet when the cylinder reaches 80 percent filled. OPD-equipped cylinders are identified by a three-lobed handle on the top of the cylinder, and are marked OPD. When cylinders are overfilled, they can become over-pressurized when they are warmed (by the grill, or perhaps by the sun). This can cause the pressure relief valve on the cylinder to open, which results in a large amount of gas being released and possibly ignited by the grill.

LP gas grills manufactured after 1995 are required to have certain safety features, including proof of seal before gas is allowed to flow, high temperature shut-off, and excess gas flow limiting devices. These features were introduced into the Canadian Standards Association (CSA) / ANSI standards at CPSC's request. However, incidents continue to occur, particularly relating to the LP tank and grill connections. There have also been anecdotal reports where safety features failed to operate. Investigations will support Fire / Gas Voluntary Codes and Standards work towards tightening the safety performance requirements for these products.

##### **B. Product Class Description**

Although primarily dealing with portable barbecue grills, this guideline is appropriate for other appliance systems that use ten to forty pound LP gas cylinders including gas stoves, heaters used in barns or other unheated spaces and applications in mobile homes, campers, and recreational vehicles.



## INVESTIGATION GUIDELINE

The typical portable LP grill system is shown in Figure 1. It usually consists of a user-owned exchangeable twenty-pound cylinder, a stand or cart which supports the grill and on which the cylinder (or cylinders) is secured, fittings and hose to connect the cylinder to the grill (including on/off valve, regulator, fittings, and hoses). The grill itself can include on/off and flame height controls, burner assemblies, artificial coals, supporting grates and grids and the fire box. On many grills the on/off controls may be on a supporting post. Some grills may also be equipped with electrical devices such as ignitors or rotisseries.

### TYPICAL PORTABLE L.P. GRILL

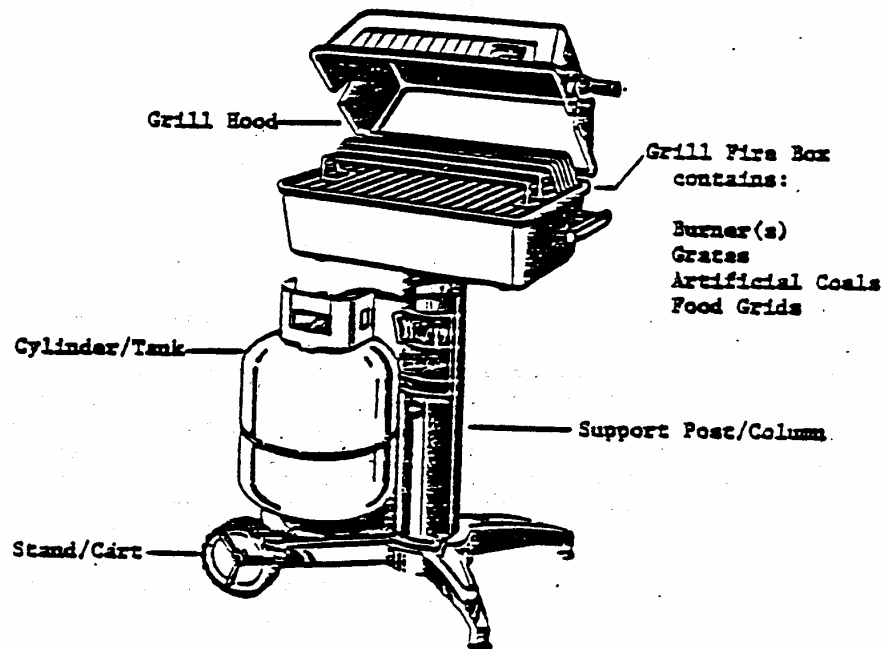
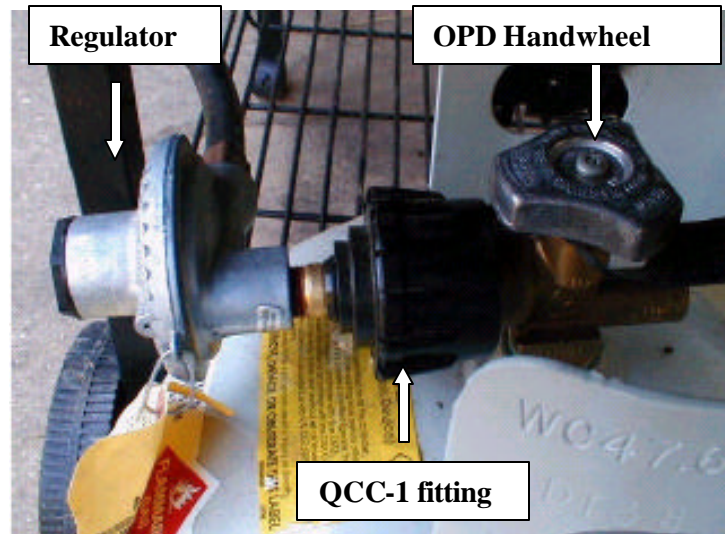


Figure 1

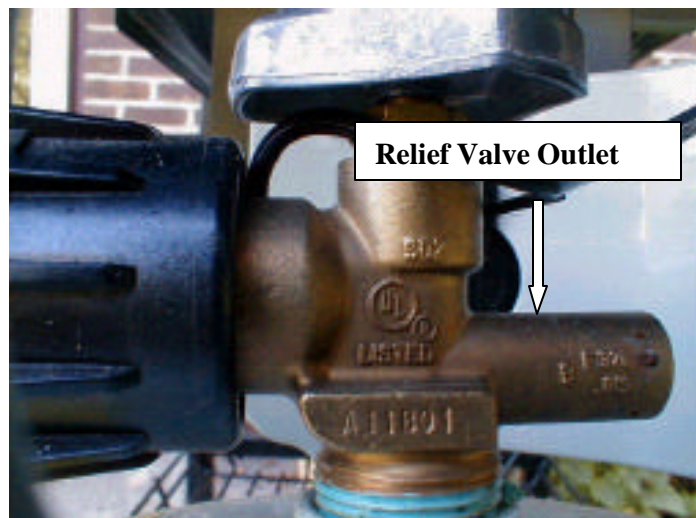


## INVESTIGATION GUIDELINE

Twenty pound LP gas cylinders generally measure approximately twelve inches in diameter by nineteen inches high. A regulator is usually attached to the cylinder valve by a quick-connect (QCC-1) fitting that consists of a plastic “knob” that connects to the cylinder valve outlet. The QCC-1 has right-handed threads that should hand tighten. The QCC-1 fitting should be marked with the manufacturer’s name. Using a tool to tighten the connection can damage the system. Figure 2 shows the connection between the regulator and the cylinder valve on an OPD-equipped cylinder (note three-lobed handle on top of valve and marked OPD). In some instances this fitting might be a spring-loaded "quick disconnect" device. Figure 3 shows the outlet of the cylinder’s pressure relief valve.



**Figure 2 Connection between tank and regulator**

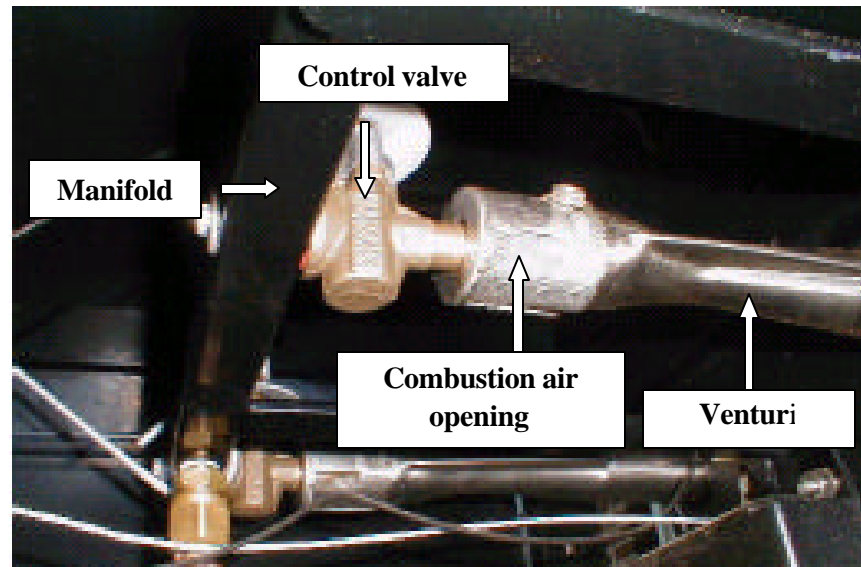


**Figure 3 Relief Valve Outlet**



## INVESTIGATION GUIDELINE

LP-gas from the regulator is supplied to the grill through hosing that connects to the gas manifold and control valves. From the control valves the gas flows through the venturi that is designed to pull in combustion air. The fuel then goes to the burners inside the grill firebox. Figure 4 shows a gas manifold, control valve, venturi and combustion air inlet on a typical grill.



**Figure 4 Control valve, manifold and venturi**

Cylinders should be purged of any outside air at time of initial filling as well as anytime after air, water, or other contaminants have entered the cylinder. If a cylinder is overfilled, or filled without being purged of air during the filling process, a hazardous situation may result from gas leaks that can occur especially when this cylinder becomes over-pressurized when heated.

Cylinders should not be stored indoors. If they are brought indoors a hazardous situation may result since there is potential for LP gas to escape due to improperly closed valves, loose fittings or over-pressurization. Cylinders should be stored outdoors in a well-ventilated space away from direct sunlight.

### C. Specific Items of Interest

Determine when cylinder was last filled, and any intervening usage or sequence of events related to the incident. If there was a fire involving a gas leak, try to determine the exact place where gas was escaping. There have been reports that the safety features incorporated into the QCC-1 connectors are not activating as designed. Safety features that are internal parts of the QCC-1 connectors include a “no flow without leak-tight seal” feature, over-temperature shut-off feature, and proof of seal feature. CPSC has reports of small flames at the QCC-1 which indicate the “no flow without leak-tight seal” feature is not working. There are also reports that the over-temperature shutoff feature is not activating to turn off the flow of gas in event of a fire. Photograph the unit, if possible, paying particular attention to the fittings and area between the



## **INVESTIGATION GUIDELINE**

tank and the grill since the spatial relationships of hoses, regulator, fittings, and grill body are important. Information about proof of seal before gas is allowed to flow, high temperature shut-off, and excess gas flow limiting devices are of particular interest and the connection between the cylinder and regulator should be photographed.

### D. Headquarters Contacts

Donald Switzer ESFS 301 504-7534  
Alberta Mills EPHA 301 504-7479

## **II. INSTRUCTIONS FOR COLLECTING SPECIFIC INFORMATION**

The following instructions are not intended to limit or define the investigation of portable LP system incidents. They are intended to highlight areas of interest in addition to those obtained for every investigation.

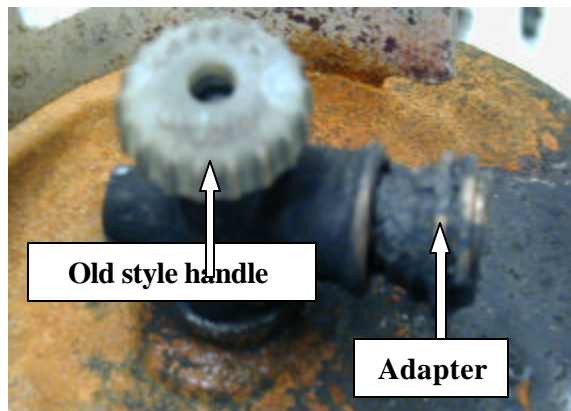
Please note that this is a guideline, not a checklist. Any relevant information discovered in the course of the investigation should be included regardless of whether it has been anticipated here.

### A. Synopsis

Provide a brief description of the events, in chronological order, leading to the incident. It is very important to identify if the incident happened the first time the cylinder was used after re-filling. If the incident is the result of the pressure relief valve opening, the initial flame will be like a huge blowtorch directed horizontally. Did the consumer hear a loud “popping” sound prior to the fire? Did the incident start with a small fire and suddenly grow in size? Estimate the size of the initial flames. Where did the consumer first notice flames? Did the initial flames originate at the connection between the regulator and the cylinder? Did the initial flames originate from under the grill in the area of the control valves or venturi? Some older cylinders have been retrofitted for the QCC-1 with adapters as shown in Figure 5. These adapters may be marked as LP adapters. The old style handle will not have the three-lobed handle, which is indicative of an OPD handwheel.



## INVESTIGATION GUIDELINE



**Figure 5 Cylinder with adapter**

Specify the human actions leading to the incident, time intervals between significant chronological events, the specific part(s) of the grill involved, and the nature and severity of the outcome. Because we will frequently be using a computer to retrieve the data, please make sure that the following key words are used in free text synopsis as appropriate: burner, cylinder (or tank), explosion, fitting(s), grill control(s), hoses, igniter, leak, lighting, LP gas, on-off valve, overfilling, refill(ed), regulator, stand (or cart), tank collar.

### B. Description of Incident Environment

- Describe sequence of events leading to the incident, the incident itself and relevant events immediately following.
- Describe location of unit at time of incident, the type of surface it was on, how far away it was from any structure or flammable object.
- Describe the weather conditions immediately preceding the incident especially air temperature and wind.
- Indicate the temperature conditions the cylinder may have been exposed to prior to the incident, e.g., in a closed car or trunk on a hot day. Was cylinder stored or being used in direct sunlight?
- If fire incident, describe item(s) that burned, and which was first to ignite. If flame noted coming from unit describe from where and what was ignition source. Indicate size of flame plume.



## INVESTIGATION GUIDELINE

### C. Description of Interaction between Injured Person(s) and Product

- Indicate age and sex of primary victim and others who sustained any injuries. Describe body location and severity of injury.
- Describe any victim competency-reducing factors' such as medication, physical handicaps, alcohol, and impaired vision.
- Describe grill operator's knowledge, familiarity, and experience with the grill and the cylinder. Was grill operator (or owner) familiar with Owner's Manual and safety precautions related to proper operating procedures?
- Indicate when and from where grill and cylinder were acquired.
- Who assembled the grill when it was new?
- Describe the maintenance history of the grill and the cylinder. Indicate when who last serviced unit, when it was serviced, and what was done.
- Describe any previous mechanical problems associated with either the grill or the cylinder.
- Did grill owner ever experience any usage problems in properly using or understanding how product is handled? Did grill owner ever have any problem with left-hand threads at cylinder connection?
- Indicate how often grill and cylinder have been used i.e., cylinder may be different age than grill. If exact usage unknown, approximate.
- Describe how grill and cylinder are stored when not in use both for short and long periods of time.
- Did victim at time of incident smell gas? (If the cylinder is available and has not been refilled since incident, investigator should attempt to determine if odor is present in remaining gas).
- If the incident occurred in transit, was the cylinder valve safety cap in place?

*If it appears the incident occurred after the cylinder was refilled, either shortly afterwards or during the next usage, answer the following questions*

- When the cylinder ran out of gas how much afterwards was valve closed (if the valve was closed at all?
- Did the owner fill their own cylinder?
- If not, identify where and by whom the tank was refilled. If an empty tank was exchanged for a full tank, identify where this exchange occurred.



## INVESTIGATION GUIDELINE

- What was the approximate air temperature in area where refilling was done.
- When cylinder was reattached did owner test for leaks before using. Describe testing procedure.

*The following refill-related points should be determined by talking with the refiller:*

- Was air removed (purged) from the cylinder before or during the filling process?
- Was cylinder filled by weight (cylinder weighed during fill process) or by volume (either predetermined amount of LP-is injected into cylinder or until a plume of LP comes out the vent)?
- What kind of training or instructions did person doing filling have?

### D. Description of Product

- List grill manufacturer's name, brand name of grill and model/serial number.
- Determine size of cylinder/tank and identify manufacturer. Describe any markings or labels present on cylinder. Specify text.
- Describe grill dimensions including height, depth, and square inches of cooking surface. Indicate if single or double burner and burner shape (round, H bar, square or other).
- Indicate how cylinder was secured to grill assembly, the location of the cylinder i.e. directly under firebox, on one side, etc. Indicate the distance from the top of the cylinder to the grill (firebox).
- Was there more than one cylinder/tank present? Indicate where they were.
- Indicate if the fitting between the regulator and cylinder valve is a threaded or quick disconnect type.
- Describe any hose(s) that may be present including size, color, length and any markings. Indicate how near hose(s) may come to bottom or side of grill {firebox}.
- Describe regulator appearance and markings. Indicate how connections are made between regulator and cylinder and regulator and hose(s). Describe fittings involved.
- Describe any markings that may be on cylinder valve.
- Indicate if there was a liquid outage gauge on the cylinder.
- Describe grill controls, location and how they function.





## **INVESTIGATION GUIDELINE**

- Photograph all components of the grill, the cylinder and the fuel system.
- Describe lighting procedures or mechanisms normally used by owner or others to light grill.
- Indicate if there are other consumer-adjustable features such as combustion air shutter openings. Describe how they work and whether owner used them.
- Describe any overfill safety devices on the LP gas tank.
- The voluntary standards for gas grills sold after 1994 require a flow limiting device to shut off gas flow if a leak is detected between the grill and tank, so cases where this device apparently failed are of special interest.
- With the product information, include the age of the grill, and if any modifications were made to the product.

### **E. Other**

- Specify if unit was repaired, replaced, returned or discarded after incident.
- Give dollar value estimate of any property damage. State source of estimate.

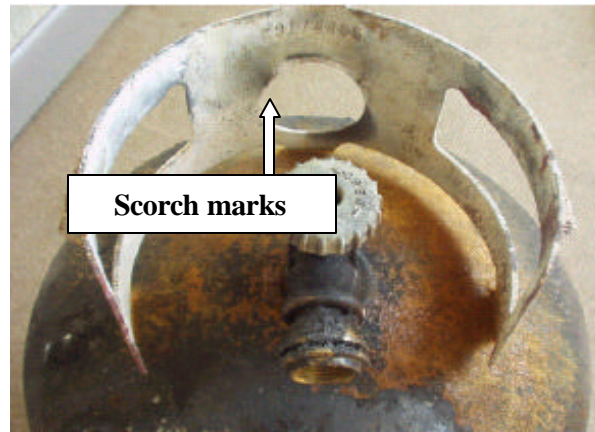
## **II. PHOTOGRAPHS/DIAGRAMS OF INCIDENT SCENE**

Before taking pictures, the unit should be positioned as it was at the time of the incident. This includes hood opening, cylinder orientation, and valve, regulator, and hose position.

- Photograph entire unit especially in a way that will show spatial relationship between hose(s)/fittings and grill body and cylinder.
- Photograph grill, LP tank, and propane tank-to-grill connection, and venturi area of grill if possible.
- Photograph any labels that may be present on cylinder or grill.
- Take close-up photographs of valves, fittings, adapters, and regulator.
- Take close-up photograph of inside of cylinder collar (see figure 6) for scorch marks indicating the relief valve opened.
- Diagram incident scene indicating distances between unit, nearby structures, and other flammable objects.



## INVESTIGATION GUIDELINE



**Figure 6 Cylinder collar  
with scorch marks**

#### **IV. OBTAINING SAMPLES AND DOCUMENTS RELATED TO THE INVESTIGATION**

- Specify if fire department was summoned and obtain a copy of the report, or any insurance or repair reports (if available).
- If owner's manual available, photocopy those sections dealing with assembly, safety or maintenance.
- If products are available for sample collection, contact Don Switzer 301-504-7534.