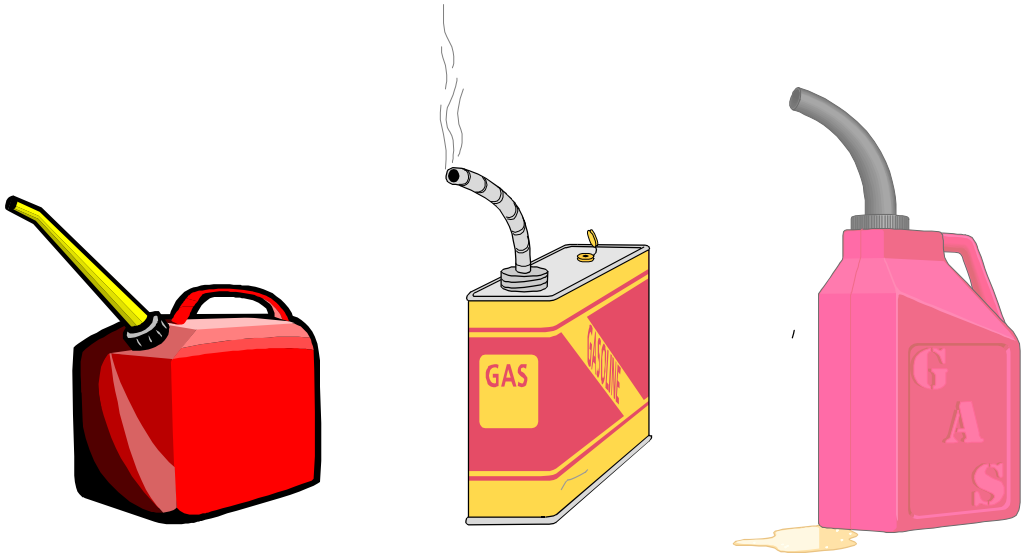
California Environmental Protection Agency

Air Resources Board

HEARING NOTICE AND STAFF REPORT

INITIAL STATEMENT OF REASONS FOR PROPOSED RULE MAKING PUBLIC HEARING TO CONSIDER THE ADOPTION OF PORTABLE FUEL CONTAINER SPILLAGE CONTROL REGULATIONS

August 6, 1999



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STAFF REPORT:
INITIAL STATEMENT OF REASONS FOR PROPOSED RULE MAKING
PUBLIC HEARING TO CONSIDER THE ADOPTION OF PORTABLE
FUEL CONTAINER SPILLAGE CONTROL REGULATIONS

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EXECUTIVE SUMMARY

The Air Resources Board (ARB or Board) staff are proposing regulations for portable fuel containers. Portable fuel containers or "gas cans" are made of either plastic or metal and are sold in a variety of shapes and sizes ranging in capacity from one gallon to more than six gallons. "Gas Cans" are designed for transporting, storing, and dispensing fuel.

"Gas cans" are used to refuel a broad range of small off-road engines and equipment (e.g., lawnmowers, chainsaws, personal water crafts, motorcycles, etc.). Often, refueling results in spillage when the equipment fuel tank is overfilled. Spillage can and does occur during the transport and storage of the "gas cans." These cans are also a significant source of evaporative and permeation emissions. While the emissions from a single container are small, the estimated 1998 statewide Reactive Organic Gas (ROG) emissions from all containers are almost 94 tons per day.

The proposed regulations apply to spill proof containers and spill-proof spouts manufactured and used in California and lists six performance standards. These performance standards include automatic shut-off, automatic closure, one opening for dispensing and refilling, flow rates based on container capacity, a permeation standard of 0.4 grams per gallon and per day, and one year warranty against defects in materials and workmanship. The technologies for meeting the automatic shut-off, automatic closure, and permeation requirements are available. Some containers or spouts sold today have the automatic shut-off and automatic closure features. The proposed regulations also include:

- an innovative products provision that would exempt containers or spouts from complying with all of the performance standards if the cumulative emissions are less than the emissions of a similar container that complies with the performance standards;

- a one year sell-through period for containers or spouts manufactured before the January 1, 2001 implementation date;

- labeling requirements that identify and specify the flow rate of spill proof containers and spill-proof spouts and, for spouts only, list the make, model number and size of only those containers the spout is designed to accommodate;

- procedures authorizing the Executive Officer to grant a variance after making findings regarding economic hardship, public interest affected, and method of achieving compliance; and

- four test methods that ARB would use for determining compliance with the automatic shut-off, automatic closure, fuel flow rate, and permeation performance

standards.

The 2007 statewide ROG emissions from portable fuel containers are estimated to be 101.5 tons per day, which is currently unregulated. The proposed regulations will reduce the 2007 statewide ROG emissions by an estimated 76 tons per day, representing a 75% control efficiency. This reduction would help California attain and maintain health-based state and federal ambient air quality standards for ozone. The reduction is consistent with terms of a recent lawsuit settlement with three Los Angeles based environmental organizations over the 1994 State Implementation Plan for the South Coast Air Basin.

The staff have determined that the proposed regulations will cost California consumers about $19 million per year over a five-year period. This would amount to an increase of approximately $6.00 to $11.00 per container, or a price increase of about $1.20 to $2.20 per year over the useful life of a container. An increase of this magnitude should not reduce the demand for these containers significantly. Since the regulations will result in a reduction of 76 tons per day of ROG emissions (74.9%), the cost effectiveness of these regulations is estimated to be $1.72 per pound.

The staff held three workshops to allow for continuing public involvement and input throughout the development of the proposed regulations. In addition the staff considered four alternatives including no action, controls for refueling spillage only, the proposal without the permeation standard, and the proposal. Staff determined that adopting the proposal is technologically feasible and cost effective.

I. Introduction

This report presents the Air Resources Board (ARB/Board) Proposed Portable Fuel Container Spillage Control Regulations and the Initial Statement of Reasons for Proposed Rulemaking as required by the California Administrative Procedure Act. The proposed regulations employ a set of performance standards for new portable fuel containers and spouts. Compliance with the performance standards will substantially reduce hydrocarbon (HC) emissions associated with the use of these products.

In this report, the term portable fuel container refers to containers that are designed for transporting, storing, and eventually dispensing fuel from a retail distribution point to a point of use. Commonly referred to as "gas cans," these products come in a variety of shapes and sizes with nominal capacities ranging in size from less than one gallon to over six gallons. Available in metal or plastic, these products are widely used to refuel equipment and vehicles when the situation or circumstances prohibits direct refueling from a retail distribution point, or "gas station." From the standard metal five gallon "jerrican" to the plastic one gallon "gas can," these products provide one of the final links in the fuel distribution chain.

Conventional portable fuel containers are a significant source of HC emissions in California. Reactive Organic Gases (ROG) are a subset of hydrocarbons that are involved with the formation of ozone. ROG emissions from conventional portable fuel containers are shown in this report to contribute to the State's current ozone problem.

Portable fuel containers are used to refuel a broad range of small off-road engines and other equipment (e.g., lawnmowers, chainsaws, personal watercraft, motorcycles, etc.). Often, refueling events using portable containers result in fuel spillage from overfilling equipment fuel tanks. Spillage can and does occur during the transport and storage of these portable containers; portable containers are also a significant source of evaporative and permeation emissions. While the emissions from a single portable container may appear small, when combined in the aggregate, these emissions contribute significantly to California's air quality problems.

This report addresses the need for the proposed regulations, provides a summary of the proposed regulations, presents the environmental and economic impacts from the proposal, and discusses alternatives considered along with staff's recommendations. Appendix A contains the Proposed Portable Fuel Container Spillage Control Regulations, and Appendix B contains four test methods proposed for incorporation by reference in the regulations.

II. Background

A. Legal Authority

In 1988, the Legislature enacted the California Clean Air Act (CCAA), which declared that attainment of state ambient air quality standards is necessary to promote and protect public health, particularly the health of children, older people, and those with respiratory diseases. The

Legislature also directed that these standards be attained by the earliest practicable date.

The CCAA as codified in the Health and Safety Code Sections 43013 and 43018 grants the Air Resources Board (ARB) authority to regulate off-road mobile sources of emissions and fuels. Mobile sources include, but are not limited to marine vessels, locomotives, utility engines, off-road motorcycles, and off-highway vehicles. Much of this equipment is refueled using portable fuel containers, or "gas cans." ARB therefore has the authority to regulate these portable fuel containers, or "gas cans," as adjuncts to existing and proposed off-road engine regulations, as a separate off-road mobile source category, and as an emission source associated with motor vehicle fuel.

B. Comparable Federal Regulations

Currently, there are no comparable federal regulations that address the HC emissions associated with the use of portable fuel containers. The U.S. Environmental Protection Agency (U.S. EPA) does not at this time contemplate the promulgation of regulations to control emissions from portable fuel containers.

C. Public Process

The proposed regulations incorporate comments and suggestions from portable fuel container and spout manufacturers, off-road equipment manufacturers and representatives, petroleum company representatives, environmental consultants, and Underwriters Laboratory. Staff conducted public workshops on August 6, 1998, January 26, 1999, and June 28, 1999 to aid in developing the proposed regulations. A separate workshop was held on November 20, 1998 to assist in developing the emissions inventory. The workshop notices were sent to over 2000 stakeholders comprised of air pollution control/air quality management districts and organizations involved in manufacturing portable fuel containers and off-road equipment. In developing these proposed regulations, staff considered oral and written comments received from portable fuel container and spout manufacturers, off-road equipment manufacturers and their representatives, and environmental consultants. As a result of these comments staff made several changes to the performance standards.

III. Need for Control

A. State Implementation Plan (Ozone)

On November 15, 1994, the ARB adopted the State Implementation Plan (SIP) for ozone which was subsequently approved by the U.S. Environmental Protection Agency (U.S. EPA) on September 25, 1996. The SIP serves as California's overall strategy for achieving national air quality standards for ozone and seeks to reduce pollution in the most cost-effective manner, using a combination of performance standards and market-based programs to promote the introduction of cleaner technologies and expand compliance with existing control strategies. The 1994 SIP includes state measures to control mobile sources (including passenger cars, heavy-duty trucks

and off-road equipment) and pesticides, local measures for stationary and area sources, and federal measures for sources under exclusive or practical federal control (such as planes and locomotives). California's SIPs for carbon monoxide and inhalable particulate matter also rely on controlling these sources. In addition, many areas in California still violate our more stringent state ambient air quality standards for ozone and particulate matter.

Portable fuel containers are a significant source of ROG emissions in California and one that is currently unregulated. Spillage alone during refueling of the equipment is estimated to contribute 7.5% of the total lawn and garden ROG inventories and 8.9% of the lawnmower ROG inventories.[1] Reducing ROG emissions from portable fuel containers will result in real emission reductions and real air quality improvement. These emission reductions are needed to achieve the state and federal air quality standards throughout California. However, because the 1994 SIP did not include emissions from portable fuel containers, the emission reductions cannot be credited toward the 1994 SIP. Emission reductions from this measure will be credited toward the SIP when ARB revises our inventories and statewide control strategy in 2000 or 2001.

B. SIP Settlement

On January 28, 1999, the Board approved a settlement with three Los Angeles based environmental groups regarding the 1994 State Implementation Plan for Ozone (SIP) litigation (Coalition for Clean Air v. South Coast Air Quality Management District). The lawsuit was filed against the South Coast AQMD, the ARB, and the U.S. EPA for failure to implement specific measures contained in the 1994 SIP.

ARB has aggressively pursued every feasible emission reduction over the past four years to meet our near-term emission reduction commitment of 266 tons per day of ROG and NOx. As ARB has implemented the SIP over the last four years, some measures have delivered more reductions than anticipated, while other measures have delivered fewer reductions due to technical or economic concerns. ARB's ongoing evaluation has also demonstrated that some regulatory strategies in the 1994 SIP are infeasible or would be ineffective in reducing emissions. ARB has not implemented those measures. All emission reduction shortfalls need to be replaced to achieve attainment.

The lawsuit settlement addresses near-term emission reduction shortfalls of 42 tons per day of ROG and 2 tons per day of NOx in the South Coast Air Basin in 2010. Under the terms of the settlement, ARB is obligated make up these shortfalls by adopting new measures between 1999 and 2001.

In 1999 and 2000, ARB staff will present a number of control measures to the Board for consideration, including: enhanced vapor recovery, this portable fuel container control measure, emission standards for medium and heavy-duty gas trucks, a lower NOx standard for bus engines, additional reductions from consumer products, and a suggested control measure for architectural coatings. The Board is not obligated to adopt specific proposals; however, specific tonnage commitments must be met each year.

Because the 1994 SIP did not include emissions from portable fuel containers, this measure is not creditable toward the SIP lawsuit settlement tonnage targets. However, both ARB and the plaintiffs recognized the importance of controlling this large source of previously uncontrolled ROG emissions. Thus the settlement requires us to take a proposal to the Board during the third or fourth quarter of 1999 with an implementation date no later than 2001. Based on information available at the time, the settlement contained an estimated reduction of 10 –15 tons per day of ROG emissions in the South Coast Air Basin in 2010 due to the portable fuel container control measure.

IV. Plain English Summary of Proposal

A Introduction

In this chapter, we provide a plain English discussion of staff's proposed portable fuel container spillage control regulations. We will identify the major requirements of the regulations, explain the rationale for each provision, and discuss their feasibility. Emissions referred to in this and the following sections are expressed in terms of Calendar Year 2007 (CY 2007). The discussion in this chapter is intended to satisfy the requirements of Government Code 11346.2(a)(1), which requires that a noncontrolling "plain English" summary of the regulations be made available to the public.

B. Applicability

The proposed regulations would apply to all new portable fuel containers and spouts manufactured for sale and use in California. The regulations are not intended to apply to single trip prepackaged containers, nor to portable containers that by their design or labeling are intended primarily for storing or transporting liquids or products other than fuel. The regulations are intended to reduce refueling emissions from those equipment and engines in the off-road categories that are predominantly refueled with portable containers.

Staff are aware that a small percentage of on-road vehicles are occasionally refueled from portable containers. However, staff have determined that a majority of the conventional containers currently on the market will not fit many of the various fuel filler neck configurations found on present on-road vehicles. It is necessary in these instances to use a supplemental device, such as a funnel, to perform the refueling event. Staff believe it would be unfair and costly to expect manufacturers of portable fuel containers to carry two product lines, one that complies with the proposed regulations and one specifically designed for on-road refueling, not to mention the confusion this may cause consumers. Therefore, staff's proposal applies to all portable fuel containers, regardless of their intended refueling use. Staff believe this to be an equitable arrangement since refueling on-road applications can still be accomplished using the new containers with the aid of a supplemental device, such as a funnel.

C. Performance Standards

The performance standards in the proposed regulations are divided into two sections, one specifically addressing spill-proof systems and one for spill-proof spouts. Originally, staff had planned to address the emissions from the use of the portable fuel containers by proposing only one set of performance standards for the new containers. However, staff identified several manufacturers that sell prepackage conventional spouts for use on a variety of products, including portable fuel containers. This was a cause for concern on two levels. First, this would give an unfair advantage to the spout manufacturers as the proposed regulations require manufacturers of portable fuel containers to place a spill-proof spout on the new container at a substantial cost increase when compared to conventional spouts. Second, this would allow consumers an easy way to circumvent the proposed regulations by purchasing a conventional spout to replace the spill-proof spout on the new containers. Therefore, staff have included a separate set of performance standards that apply to spouts manufactured for use on portable fuel containers.

1. Automatic Shut-off

This standard requires that the spout automatically stop the fuel flow before the equipment fuel tank overflows, while filling it to a prescribed level. The automatic shut-off performance standard applies to both spill-proof systems and spill-proof spouts.

Spillage often occurs when using portable fuel containers to refuel small off-road equipment. This can be the result of sloppy fuel transfer from the container to the equipment fuel tank or the result of overfilling the equipment fuel tank. Either way, once this fuel has been spilled, there is no way to get it back into the portable fuel container. This fuel will eventually evaporate and find its way into the ambient air. Refueling spillage has been determined to be responsible for approximately 8 tons per day of ROG emissions in California (CY 2007).

To eliminate the problem of overfilling spillage, staff are proposing that all containers and spouts employ an automatic shut-off feature. Several manufacturers already have products on the market with this feature. The automatic shut-off feature works by venting vapor displaced from the equipment fuel tank into the portable fuel container through the spout. As the liquid fuel from the portable container displaces vapor in the equipment fuel tank, this displaced vapor is directed into the portable fuel container through the spout. When there is no more air to displace, i.e., the equipment fuel tank is full, then the liquid from the portable fuel container stops flowing. Recovering this displaced vapor has the added benefit of reducing fuel vapor exposure to the consumer. Conventional containers use a separate vent hole to permit air to enter the container to replace the dispensed fuel, allowing the displaced vapors from the equipment fuel tank to escape into the atmosphere.

This performance standard also specifies a prescribed ‘fill-level’ of less than or equal to one inch below the top of the target fuel tank opening. The ‘fill-level’ standard is necessary to ensure that the equipment fuel tank is filled to the maximum extent. This will eliminate unnecessary refueling of under-filled equipment fuel tanks and ensure customer satisfaction with

the new products.

2. Automatic Closure

The standard requires that the spout automatically close when removed from the equipment fuel tank and remain closed when not dispensing fuel. The automatic closure performance standard applies to both spill-proof systems and spill-proof spouts.

Portable fuel containers transport and store fuel as part of normal use. When the container is empty, it is taken to a local service station to refill. Several types of businesses (e.g., landscape and maintenance professionals) transport portable fuel containers on a regular basis. Containers are often transported with open spouts and open vent caps. Fuel spillage can and does occur during this transportation. Also, these open spouts and vent caps can lead to fuel spillage if the container is upset or overturned. Transport and storage losses from portable fuel containers have been determined to be responsible for approximately 10 tons per day of ROG emissions statewide (CY 2007).

Both transportation and storage of open containers can also lead to substantial losses due to diurnal evaporative emissions. An open container can lose as much as 20 grams of fuel a day due to evaporation during the normal temperature cycle experienced in many parts of the state. Evaporative emissions from portable fuel containers have been determined to be responsible for approximately 72 tons per day of ROG emissions statewide (CY 2007).

The performance standard is designed to potentially eliminate transport and storage losses, as well as reduce evaporative losses, occurring from the normal use of the portable fuel container. By requiring a self-closing spout attached to the new containers, we can substantially mitigate fuel spillage during transport and storage, but also substantially reduce the evaporative emissions from the containers. Again, several manufacturers have products currently on the market that comply with this performance standard. After the refueling event, theses products automatically close and seal the spout by means of a spring loaded closure. Once closed, the fuel within the container is not subject to evaporative losses, since it only vents to the atmosphere immediately prior to use, and the chance of spilling fuel during transport and storage is virtually zero.

3. One Opening

The standard requires that the container have only one opening for both filling and pouring. The one opening performance standard applies to spill-proof systems only.

In order to ensure proper operation of the automatic shut-off feature the new containers must be non-vented. Allowing a secondary vent source during the refueling event would allow air to enter the container that is not directed through the spout from the equipment fuel tank. Adding a secondary vent would defeat the automatic shut-off feature and result in fuel spillage. In addition, consumers may inadvertently leave this vent open under the mistaken impression that the automatic shut-off feature will stop the fuel flow before the equipment fuel tank overflows.

However, this is not the case. In fact, secondary vents on the new containers could actually cause an increase in the incidence of over-filling spillage.

Secondary vents are also a substantial source of evaporative emissions. As previously stated, many current owners of portable fuel containers store them with this secondary vent open. This means that as long as the secondary vent is open, the portable container will continue to create evaporative emissions. Also, this open vent is a source of container transport and storage spillage. As discussed in the previous section, one of the factors in mitigating both transport and storage spillage, and evaporative emissions, is ensuring that the container remains closed when it is not being used to perform a refueling event.

For proper operation of the automatic shut-off feature, and to obtain the full benefit from the automatic closure feature, it is imperative that these new containers vent only through the spout and remain closed when not in use. Staff have determined that this is best accomplished by disallowing the standard secondary vent feature found in most conventional containers.

4. Fuel Flow Rate

The performance standard specifies three fuel flow rates that are a function of container capacity. These flow rates are:

> not less than one-half gallon per minute for portable fuel containers with a nominal capacity less than or equal to 1.25 gallons,
>
> and
>
> not less than one gallon per minute for portable fuel containers with a nominal capacity greater than 1.25 gallons but less than or equal to 2.5 gallons,
>
> and
>
> not less than two gallons per minute for portable fuel containers with a nominal capacity greater than 2.5 gallons.

The fuel flow rate performance standard applies to both spill-proof systems and spill-proof spouts.

Staff believe that specifying three different flow rates is necessary to properly refuel the various equipment fuel tank configurations and sizes while ensuring consumer satisfaction. For example, requiring a two gallons per minute flow rate for a container with a nominal capacity of one gallon that is used to refuel hand-held lawn and garden equipment is not practicable and may not be safe. Conversely, allowing a flow rate of less than two gallons per minute for larger containers (greater than 2.5 gallons) would likely result in consumer dissatisfaction. One aspect of the automatic shut-off feature intrinsic to these new spouts is a slightly reduced flow rate when compared to conventional containers and spouts. This is due largely to the fact that the spout

must not only dispense the fuel, but must also direct the displaced vapors from the equipment fuel tank back into the portable container. Staff are concerned that if the flow rates are not sufficient to satisfy the end user, frustration with the new products would result. Such frustration could lead to tampering with the spill-proof system, such as adding a secondary vent to increase the flow rate. To address this problem, staff believe its necessary to specify acceptable flow rate standards.

Several products are currently on the market that comply with this performance standard. The three flow rates outlined in this section are intended as a minimum acceptable standard. We expect manufacturers of portable fuel containers and spouts to not only meet these standards, but to exceed them as the market dictates.

5. Permeation Standard

The standard requires that the container not exceed a permeation rate of 0.4 grams per gallon per day as determined by Test Method 513. The permeation standard applies to spill-proof systems only.

Approximately 75% of the residential population of portable fuel containers in California are made from a plastic substance known as High Density Polyethylene (HDPE). One of the properties of HDPE, or plastic, portable fuel containers is that they eventually become saturated with fuel and individual hydrocarbon molecules will penetrate the plastic and find their way to the outside air. This process is called permeation. Saturation times are dependent upon temperature and container wall thickness and can occur in as little as 25 days. Extensive testing has documented this process in recent years, much of it performed by the suppliers of polyethylene material themselves.[2,3] As expected, staff found that metal containers did not allow permeation.

Staff have recently performed extensive testing to determine an average rate for all plastic portable fuel containers. Several containers of various sizes from different manufacturers were tested and an average of 1.57 grams per gallon per day was identified as the average loss rate attributed solely to permeation.[4] Permeation emissions from plastic portable fuel containers have been determined to be responsible for approximately 8 tons per day of ROG emissions statewide (CY 2007).

The issue of permeation from plastic is not new. Several techniques are available to reduce permeation from HDPE containers. Rather than using a monolayer as is typical of current conventional containers, the container may be constructed of several coextruded (coex) layers of different plastic materials including an ethylene vinyl alcohol (EVOH) layer that acts as a barrier to permeation. Automobile manufacturers have almost universally selected this approach for fuel tank construction due to strict evaporative emission standards and differences in fuel specifications. Switching from a monolayer to a coex container is one potential way to meet the permeation standard. However, the cost of initially switching to coex is much higher than the other alternatives. Staff believe that the cost effectiveness of a coex container will improve as the production of spill-proof containers and systems increases.

Staff have identified several cost-effective alternatives to control permeation emissions from portable fuel containers in the near term. It is possible to apply a barrier surface treatment on plastic portable fuel containers to substantially mitigate the effects of permeation. Staff tested two such post production barrier surface treatments, fluorination and sulfonation.

Both fluorination and sulfonation expose the post-molded plastic containers to a specific concentration of treatment gas, fluorine and sulfur trioxide gas respectively. By controlling the various treatment factors such as gas concentration, exposure time, temperature, and pressure, a barrier surface can be created to resist permeation. Both processes have been used successfully on HDPE monolayer automotive fuel tanks. By controlling the various treatment factors fluorination is able to create various levels of barrier efficiency. Level 1 being the lowest, or least effective barrier, and level 5 being the highest. Sulfonation on the other hand has only one effective barrier level, however, the various treatment factors may be adjusted to achieve varying results.

To verify the effectiveness of these two types of treatment processes, staff selected identical sets of plastic portable fuel containers and submitted them for treatment by sulfonation and fluorination. After they were returned, staff used the same test protocol that was employed to develop the average permeation rate from untreated containers. Sulfonated containers were tested and two levels of fluorinated containers, level 3 and level 5, were also tested. The results are shown in Table 1.

A more detailed summary of the test data and procedures can be found in the ARB staff report titled, Test Protocol and Results for the Determination of Permeation Rates from High Density Polyethylene Containers and Barrier Surface Treatment Feasibility Study. It should be noted that the average untreated container permeation rate of 1.57 grams per gallon per day is used as a baseline for determining the efficiency of the barrier surface treated containers.

As shown in Table 1, the fluorinated containers did show a marked increase in average permeation rates from the initial tests to the secondary tests, performed approximately thirty days apart. Staff believe that this is due in part to the continued swelling and paneling of the container walls during exposure to the variable temperature profile. This raises some doubt as to the durability of fluorination as a viable control against the effects of permeation. This degree of degradation of the barrier surface five months after treatment suggests that fluorination may not remain effective over the useful life of the container. However, data suggest that the sulfonated containers do not have any significant longevity problems as a barrier surface treatment.[5]

To ensure compliance with the permeation standard over the useful life of the portable fuel container staff have incorporated a durability procedure into the permeation test protocol. This will enable staff to determine if a particular control strategy has the ability to remain effective over the useful life of the portable fuel container.

Table 1
Permeation Results of Barrier Surface Treated

Initial Tests		Secondary Tests		Results	
Barrier Treatment Type	Initial Tests (g/gal/day)	Secondary Tests (g/gal/day)	Follow Up Tests (g/gal/day)	Combined Average (g/gal/day)	Control Efficiency (%)
Fluorinated Level 5	0.24	0.43	0.16	0.28	82.2
Fluorinated Level 3	0.42	0.93	0.57	0.64	59.0
Sulfonated	N/A	N/A	0.07	0.07	95.5

6. Warranty

The standard requires manufacturers of both spill-proof systems and spill-proof spouts to warrant these products for a period of one year against defects in materials and workmanship. This performance standard was added to ensure consumer satisfaction with the new containers and spouts and to protect consumers' investment. As discussed later in this report, the new products are expected to be more costly to produce and we anticipate that the cost increase will be passed on to the consumer. One way to ensure that only quality spill-proof systems and spill-proof spouts find their way into the market place is to require manufacturers to warranty their products for a period of at least one year against defects in materials and workmanship.

D. Exemptions

During the development of the proposed regulations staff became aware of several special products that serve a specific purpose in the refueling community. Emissions from these containers are expected to be negligible. Therefore, staff propose the following exemptions:

1. Containers Manufactured for Sale Outside California

This exemption would allow for the manufacturing of conventional portable fuel containers and conventional spouts (not meeting the regulations) in California as long as they are shipped, sold, and used outside of California.

2. Safety Cans

Staff propose to exempt safety cans that meet the requirements of federal

Department of Transportation regulations[6] due to potential conflicts with federal and state workplace safety requirements. It is unlikely that safety cans would be purchased in significant quantities since retail prices range from $30.00 to $90.00.

3. Small Volume Containers

At the workshop staff were informed of very small fuel containers that are used to refuel model airplanes or other small model engines. Staff have determined that it is not practicable to require spill proof systems or spouts for small containers and propose to exempt portable fuel containers with a nominal capacity less than or equal to one quart.

4. Rapid Refueling Containers

Staff propose to exempt rapid refueling devices used in officially sanctioned off-road motorcycle competitions. These containers represent a specific and unique usage and due to their higher prices are not likely to represent a significant portion of the container population after the regulations are effective.

5. Portable Fuel Tanks for Outboard Engines

Staff propose to exempt portable fuel tanks that are designed specifically for outboard engines. These containers serve as portable fuel tanks for outboard engines and are not designed to dispense fuel to other portable equipment.

E. Innovative Products

A portable fuel container or spout or both can be exempted from compliance with the performance standards in the regulations if it can be classified as innovative. An innovative product may not adhere to all of the performance standards but due to its design, delivery system, or other factors, use of the product will result in cumulative ROG emissions below the highest emitting representative spill-proof system or spill-proof spout in its product category determined from applicable testing. Staff encourage the development of innovative products and realize that this type of ingenuity on the part of several manufacturers is what made the spill-proof systems and spill-proof spouts that are on the market today a reality.

To be eligible for this exemption, a manufacturer must demonstrate to the satisfaction of the Executive Officer that the use of the product will result in cumulative ROG emissions below the highest emitting representative spill-proof system or spill-proof spout in its product category as determined from applicable testing. Additionally, the applicant must identify the test methods that can be used to enforce the innovative products exemption.

F. Administrative Requirements

The manufacturers of portable fuel containers or spouts that comply with the performance standards as described in the proposed regulations are required to label these products as “Spill-

Proof Systems" or "Spill-Proof Spouts," respectively. The proposed regulations allow the manufacturers a one year sell-through period. Manufacturers may continue to sell conventional portable fuel containers and spouts provided that they were manufactured prior to January 1, 2001. This means that both spill-proof systems and spill-proof spouts will occupy retail space with conventional containers and spouts for a period of up to one year. Staff believe it is important for consumers to discern spill-proof systems and spill-proof spouts from their conventional counterparts so that consumers may make an informed choice during the sell through period. Many consumers should opt for the spill-proof systems and spill-proof spouts due to their ease of use and the benefits attributed to these products. In order to avoid any confusion on the part of the consumer staff have proposed a labeling requirement. Also, staff will monitor new products for compliance with the performance standards. For compliance purposes, manufacturers are also required to display a date code and a code indicating compliance with the performance standards on the new products and file the codes with the ARB. The proposed labeling requirement will make selection of appropriate products much easier for both consumers and compliance staff.

As previously discussed, many consumers will select their replacement containers and spouts based on their various needs. One factor in this selection will undoubtedly be the issue of flow rate. Therefore, staff have proposed that the manufacturers of both spill-proof systems and spill-proof spouts clearly identify the fuel flow rate that can be expected from their products. This will allow consumers to select products that best suit their individual needs.

Also, staff are proposing that manufacturers of spill-proof spouts that comply with the appropriate performance standards clearly display the make, model number, and size of only those portable fuel containers the spout is designed to accommodate and comply with the proposed regulations for spill-proof systems. Again, this will allow consumers to make informed choices regarding the appropriateness of their purchase with respect to their portable fuel container. Staff envision many different products available in the marketplace and anticipates that not every spout will fit every container to create a fully compliant spill-proof system. To reduce this confusion, staff are proposing a labeling requirement.

G. Variances

The proposed regulations are not expected to cause or result in extraordinary economic hardship to any person or manufacturer. To further reduce this possibility, any person who cannot comply with the performance standards, due to reasons beyond the person's reasonable control, may apply in writing for a variance.

The variance application must state the specific reasons why the variance is sought, the proposed date(s) by which compliance with the proposed regulations will be achieved, and the method for achieving compliance with the regulations. Upon receipt of a variance application, the Executive Officer will hold a public hearing to determine whether, under what conditions, and to what extent, a variance from the proposed regulations is necessary and will be permitted. All of the following findings must be made in order to grant the variance:

1. Compliance with the proposed regulations would result in extraordinary economic hardship, due to reasons beyond the reasonable control of the applicant;

2 The public interest in mitigating the hardship to the applicant outweighs the public interest in avoiding any increased emissions which would result from issuing of the variance; and

3. The methods to achieve compliance can be reasonably implemented, and will achieve compliance as expeditiously as possible.

If a variance is granted, the variance order will specify a final compliance date by which compliance with the proposed regulations will be achieved, and the increments of progress necessary to assure timely compliance. The order may also contain any other conditions that the Executive Officer deems necessary to carry out the purposes of Division 26 of the Health and Safety Code. A variance's duration will be determined by the Executive Officer, and can also be terminated, upon failure to comply with any condition of the variance. Upon application of any person, the Executive Officer may hold a public hearing to review a variance, and for good cause may modify or revoke a variance.

H. Test Procedures

Testing is necessary to determine compliance with the performance standards. The type of testing is described in the following four test methods. Each method is designed to test a specific feature, or features, of either spill-proof systems or spill-proof spouts or both as required by the performance standards.

The first three test methods, 510, 511, and 512 are used to determine compliance with the performance standards for spill-proof spouts. Compliance with the performance standards for spill-proof systems is determined using the same three test methods with the addition of test method 513. The following is a brief description of each test method including an explanation of how compliance is achieved:

(1) Test Method 510, Automatic Shut-Off Test Procedure For Spill-Proof Systems And Spill-Proof Spouts.

Using water in place of gasoline the portable fuel container is filled to its nominal capacity and inverted for a period of time to test for leaks. Water is then dispensed through the spill-proof spout into a test fixture. The test fixture is filled to a specified level to verify the performance of the automatic shut-off feature. Compliance is achieved if the spill-proof system stops the liquid flow before the test fixture overflows on all three trials and the spill-proof system fills the test fixture to a level less than or equal to one inch from the top of the opening on all three trials.

(2) Test Method 511, Automatic Closure Test Procedure For Spill-Proof Systems And

Spill-Proof Spouts.

Using water in place of gasoline the portable fuel container is filled to its nominal capacity and inverted for a period of time to test for leaks. Water is then dispensed through the spill-proof spout into a test fixture. The spill-proof spout is quickly removed when the test fixture is approximately 50% full to verify the automatic closure feature is operational. Finally, the spill-proof system is pressurized to 10 pounds per square inch (psi) with compressed air, immersed in a water bath, and observed for leaks. Compliance is achieved if no water leakage is observed while the spill-proof system is inverted or when the spill-proof system is quickly removed after filling the test fixture to 50% of its capacity, and no leaks are visible during the pressure test.

(3) Test Method 512, Determination Of Fuel Flow Rate For Spill-Proof Systems And Spill-Proof Spouts.

Using water in place of gasoline the portable fuel container is filled to its nominal capacity and evacuated through the spill-proof spout while the event is timed. The spill-proof system is pre and post weighed to determine the amount of water dispensed and an average flow rate is calculated in gallons per minute. After calculating the flow rate for three individual tests, an average of these tests is calculated to determine the final flow rate in gallons per minute.

(4) Test Method 513, Determination Of Permeation Rate For Spill-Proof Systems.

The portable fuel container is exposed to 1000 pressure/vacuum cycles with heated air and is then filled with gasoline and allowed to precondition at ambient temperature and pressure for a minimum of four weeks. The portable container is then emptied, blown dry, and immediately refilled with Phase II California Reformulated Certification (CERT) fuel. The container is then plugged and sealed with an impermeable epoxy sealant. After the sealant has cured the container is then weighed and subjected to a 24-hour variable temperature profile used for vehicle evaporative emissions testing. The container is then re-weighed and the weight loss in grams is calculated. After calculating the permeation rate for each 24-hour cycle, an average of five selected consecutive rates is calculated to determine the final permeation rate in grams per gallon per day.

I. Severability

Each section of the proposed regulations is deemed severable, and if any part of the regulations is held to be invalid, the remainder of it will continue in full force and effect.

V. Implementation

The proposed regulations are scheduled for implementation January 1, 2001. As

previously stated, this includes a one year sell through for products manufactured before January 1, 2001. All containers sold after December 31, 2001 must comply with the regulations.

Compliance with the proposed regulations will be accomplished primarily through attrition. As containers wear out, are lost, damaged, or destroyed, consumers will purchase new spill-proof containers to replace existing conventional containers. With the scheduled implementation date of January 1, 2001, the proposed one-year sell through period, and an average useful life of five years, full implementation is anticipated by January 1, 2007.

To ensure compliance with the regulations, staff proposed the same approach that was used when the first consumer products regulations were implemented in the mid 1990's. The first year after implementation will focus on notification to the manufacturers to ensure compliance with the administrative requirements. After the first year, staff will purchase containers throughout the state and submit them for compliance testing. Staff believe that this on-going presence will ensure portable fuel containers sold in California will comply with the performance standards.

VI. Environmental and Economic Impacts

A. Environmental Impact

1. Air Quality Impacts

a. Emissions Reductions (Statewide)

The proposed regulations are designed to reduce the amount of ROG emissions emitted into the environment from portable fuel containers. Compliance with the proposed performance standards are designed to achieve the maximum ROG emissions reductions feasible. The estimated statewide emission reductions are summarized in Table 2. Staff estimate a 2007 statewide ROG reduction of over 76 tons per day, representing approximately a 75 percent reduction of emissions.

b. Emissions Reductions (South Coast Air Basin)

The estimated South Coast Air Basin emission reductions are summarized in Table 3 below. These emissions reductions are important because the 1994 SIP lawsuit settlement envisioned a reduction of 10 - 15 tons per day of ROG by 2010. Staff estimate a 2010 South Coast Air Basin ROG reduction of 33.7 tons per day, representing a reduction of almost 75 percent.

Table 2

Statewide Summary of Emissions and Emission Reductions from the Proposed Regulations

Year	Uncontrolled ROG Emissions (tons/day)	Controlled ROG Emissions* (tons/day)	ROG Reductions* (tons/day)	Percent Reduction* (%)
1998	93.4			
2007	101.5	25.3	76.2	75.1
2010	103.6	25.8	77.8	75.1

* Assumes adoption of staff proposal

Table 3

South Coast Air Basin Summary of Emissions and Emission Reductions from the Proposed Regulations

Year	Uncontrolled ROG Emissions (tons/day)	Controlled ROG Emissions* (tons/day)	ROG Reductions* (tons/day)	Percent Reduction* (%)
1998	40.6			
2007	44.1	11.1	33	74.8
2010	45.0	11.3	33.7	74.9

* Assumes adoption of staff proposal

c. Toxic Air Pollutants

In addition to reducing ROG emissions, the proposal will reduce public exposure to constituents found in gasoline such as benzene. The Board has identified benzene as a toxic air contaminant. Staff did not quantify the risk reductions of the proposal but believe that the spill-proof features and other measures (permeation) would reduce statewide benzene emissions attributed to the use of portable fuel containers in 2010 by 75 percent, the same reduction as for ROG.

2. Water Quality

In recent years California has seen a dramatic increase in the number of marine pleasure craft used on our lakes and rivers. In December 1998 the ARB approved regulations to reduce emissions of hydrocarbons and oxides of nitrogen from spark-ignited marine engines. The first tier of these exhaust emission standards is scheduled to take effect with the 2001 model year. Approval of these regulations was based solely on air quality impacts, but since marine engines exhaust through the water, water quality was also considered.

The ARB's proposed portable fuel container spillage control regulations may also improve water quality in our lakes and rivers. Many marine pleasurecraft, especially personal water craft (PWC), are refueled using portable containers and the possibility of fuel spillage during 'on the water' refueling is always present. The new spill-proof systems would allow users of pleasurecraft to refuel their engines without fuel spillage. This would eliminate the potential discharge of fuel into the aquatic environment from the refueling of pleasurecraft.

3. Secondary Impacts

In Section IV. (Permeation Standard), staff stated that the proposed permeation standard may be met by barrier surface treatment (fluorination and sulfonation) of the portable fuel containers. Some manufacturers expressed interest in treating containers on-site but were concerned about the toxicity of the substances used to treat the containers and the recyclability of the treated material. Barrier treatment is currently used on a variety of consumer product containers including those used for food services. No toxic residue is imparted that would affect the recyclability of the treated containers. Several barrier surface treatment companies are willing to provide on-site treatment to accommodate those manufacturers wanting to incorporate the surface treatment in the manufacturing process. Both sulfonation and fluorination incorporate a closed loop self contained system that complies with federal Food and Drug Administration (FDA) regulations. Staff believe that the impacts of barrier surface treatment would be minimal and necessary to achieve the health based air quality standard for ozone.

B. Economic Impact

Overall, we do not expect the proposed regulations to impose a significant cost burden on the portable fuel container and spout manufacturers. We have been able to identify 17 manufacturers of portable fuel containers nationwide; only three small manufacturers are located in California. The proposed regulations are estimated to cost California consumers about $19 million per year over a five year period assuming that manufacturers are able to pass on the entire cost of the regulations to the portable fuel container purchasers. This cost increase amounts to approximately $6.00 to $11.00 per container, or about $1.20 to $2.20 annually. A price increase of this magnitude is not expected to reduce the demand for these containers significantly. As a result, staff expect the proposed regulations to impose no noticeable adverse impact on California competitiveness, employment, and business status. The following sections present and seek to fulfill the ARB's legal requirement related to economic analysis and economic impact information for the various stakeholders affected by these proposed regulations.

1. Legal Requirement

Section 11346.3 of the Government Code requires State agencies to assess the potential for adverse economic impacts on California business enterprises and individuals when proposing to adopt or amend any administrative regulations. The assessment shall include a consideration of the impact of the proposed regulations on California jobs, business expansion, elimination or creation, and the ability of California business to compete.

Also, section 11346.5 of the Government Code requires State agencies to estimate the cost or savings to any state, local agency and school district in accordance with instructions adopted by the Department of Finance. The estimate shall include any nondiscretionary cost or savings to local agencies and the cost or savings in federal funding to the state.

2. Businesses Affected

Any business involved in manufacturing and use of portable fuel containers and spouts will potentially be affected by the proposed regulations. Also, potentially affected are businesses that supply parts to these manufacturers, and sell these containers in California. The focus of this analysis, however, will be on the portable fuel and spout manufacturers because these businesses would be directly affected by the proposed regulations. These manufacturers fall into the industry classified by Standard Industrial Classification (SIC) 3089 or by the new North American Industry Classification System (NAICS) 326199.

a. Container / Spout Manufacturers

The portable fuel container and spout industry consists of seventeen manufacturers nationwide, of which seven are small manufacturers. Only three of these small manufacturers are located in California. These manufacturers usually produce a wide variety of products. Portable fuel containers and spouts generally account for only a small portion of their product portfolio. Table 4 provides a list of the large and small companies in the portable fuel container and spout industry.

b. Potential Impact on Manufacturers

The proposed regulations are expected to impose additional costs on manufacturers of portable fuel containers. A detailed analysis of these costs is provided in the cost-effectiveness section of this report. The cost analysis shows that the proposed regulations will increase average annual costs to consumers by about $19 million when the regulations become effective in 2001. The analysis assumes that manufacturers are able to pass on the entire cost increase to consumers because of the low relative price, the negligible impact on consumers' income, and the fact that there will be only a few legal substitutes available to consumers. As a result, the proposed regulations are not expected to have a noticeable adverse impact on the affected manufacturers.

Table 4
Companies in the Portable Fuel Container/Spout Industry

Large Companies	Small Companies
Rubbermaid, Inc.	Vemco, Inc.

Large Companies	Small Companies
Blitz U.S.A.	EnviroCan, Inc.
Chilton Products	Flo Tool International
Midwest Can Company	CCI Products, Inc.
Wedco Molded Products	No-Spill Research, Inc.
Briggs & Stratton Corp.	Scribner Plastics
Eagle Manufacturing Co.	Jazz Products
S & K Products	
Protectoseal Company	
Just Rite Manufacturing	

c. Potential Impact on Consumers

The potential impact of the proposed regulations on retail prices of portable fuel containers depends on the ability of manufacturers to pass on the cost increase to consumers. Assuming that manufacturers are able to pass on the entire costs of compliance to the portable fuel container purchasers, staff estimate that the average price of a container would increase by approximately $6.00 to $11.00 when the regulations become effective in 2001. This amounts to an annual increase of about $1.20 to $2.20 in the price of a container over its useful life. Since portable fuel containers have a current retail price of $4.25 on average, a price increase of this magnitude is not expected to alter the consumer-purchasing behavior. Thus, the proposed regulations are unlikely to have a significant adverse impact on the demand for portable fuel containers in California.

d. Potential Impact on Business Competitiveness

The proposed regulations would have no significant impact on the ability of California manufacturers to compete with manufacturers of similar products in other states. All manufacturers that produce portable fuel containers for sale in California are subject to the proposed regulations regardless of their location. Only three small manufacturers are located in California although others may have some operations in California. As mentioned earlier, the proposed regulations are expected to cause an increase in the retail price of a portable fuel container which is unlikely to dampen the demand for these products in California.

e. Potential Impact on Employment

California accounts for a small share of manufacturing employment in the portable fuel container industry. As stated earlier, only three small manufacturers of these products are located in California. According to the U.S. Department of Commerce, California employment in the SIC 3089 industry (includes establishments primarily involved in manufacturing fabricated plastics products or plastics film, sheet, rod, nontextile monofilaments and regenerated cellulose) was

45,560 in 1996 or about 2.5 percent of the total manufacturing jobs in California. These employees working in 976 establishments generated approximately $1.4 billion in payroll. About 107 establishments had between 100 and 500 employees, the rest had less than 100 employees. The proposed regulations affect a small fraction of firms in this industry. The affected firms are unlikely to alter their employment significantly because of the regulations. This is because while the proposed regulations result in an increase in the cost of manufacturing portable fuel containers, most firms are likely to pass on the bulk of the cost increase to consumers. As a result, the regulations are not expected to have a noticeable impact on California employment.

f. Potential Impact on Business Creation, Elimination, or Expansion

The proposed regulations would have no noticeable impact on the status of the California portable fuel container manufacturers. The regulations would potentially increase retail prices of portable fuel containers by about $6.00 to $11.00 per container. This amounts to a price increase of about $1.20 to $2.20 per year over the useful life of a container. Currently, approximately 2 million containers are sold in California annually. Consumers are unlikely to alter their purchasing behavior for such an increase in price. Also, this price increase accounts for only a small portion of their annual income

g. Potential Impact on State, Local, and Federal Agencies

State and local government entities will not incur additional costs or savings in reasonable compliance with the proposed regulations because they do not manufacture or distribute portable fuel containers. However, there may be a minimal secondary impact for such agencies purchasing containers not otherwise exempted.

VII. Cost of Compliance/Cost Effectiveness

A. Population

The first step taken by staff in assessing costs was to determine the number of portable fuel containers currently in use statewide. Staff attempted to determine statewide population through manufacturers' sales data. However, the major manufacturers do not supply retailers directly. Rather, they ship their products to distributors who in turn supply the retailers. These distributors ship the manufacturer's products to retailers all across the U.S. This made it impossible for staff to acquire state specific sales and distribution data. Therefore, staff chose to use a survey to determine the population of portable fuel containers in California.

The data used to establish the number of portable fuel containers in California were obtained from two individual surveys conducted by the Board's Mobile Source Control Division (MSCD). To determine the residential population, MSCD distributed a mail-out survey to randomly selected residences throughout the state. The commercial population was determined by both on site and telephone interviews of selected businesses in Northern and Southern California. Only those commercial businesses known to use portable fuel containers (e.g., tree trimming services,

landscape maintenance professionals, automobile tow services, etc.) were selected. Table 5 lists the statewide portable fuel container population obtained from the MSCD surveys.

Table 5

1998 Portable Fuel Container Populations Number of Units Statewide		
Sector	**Container Population**	**Percentage**
Residential	9,294,195	94 %
Commercial	584,511	6 %
Total	9,878,706	100 %

The data clearly indicate that 94% of portable fuel containers are used in residential households, and commercial use is about 6%. Therefore, the effect of the regulations on commercial users in California would be negligible since the bulk of the costs would be assumed by residential portable fuel container users.

B. Estimated Useful Life

The estimated useful life of a portable fuel container is an important factor in staff's proposal. Since the planned implementation of the regulations are through attrition, the longer the estimated useful life of portable fuel containers, the longer it will take to replace conventional with spill-proof containers. Also, the determination of the estimated useful life is an integral part of calculating total revenue from sales of conventional containers. Staff have selected an average useful life of five years as suggested by several manufacturers. The manufacturers base this estimate on a continuing analysis of both annual sales and percent of repeat business.

C. Manufacturers' Sales Figures

The estimated number of portable fuel containers sold in California per year has a strong influence in determining the cost of compliance. Since all conventional portable fuel containers must be replaced with spill-proof systems to achieve the targeted emissions reductions, and prices for these products vary by size, it was imperative for staff to determine the distribution of statewide sales by size. Using the total population and an average useful life of 5 years, staff were able to estimate the total sales of all portable fuel containers statewide.

The MSCD surveys also include information on the distribution of the various portable fuel container sizes within the overall population. Using this information along with average retail prices, staff were able to estimate total statewide revenue derived from the sale of conventional portable fuel containers.

Table 6 provides estimated portable fuel container sales figures, combined residential and commercial, based on the MSCD survey data. These sales figures are based on plastic portable fuel containers only. Staff chose to base this sales analysis on plastic containers only as they make up about 75% of the statewide population. The average sales prices represent an aggregate of suggested retail prices provided by several manufacturers and staff observations from local retail establishments. Due to the wide range of portable fuel containers currently available, staff have grouped the various sizes into three categories.

Table 6

1998 Statewide Residential and Commercial Sales Data			
Container Sizes	Statewide Sales (units)	Average Sales Price ($/unit)	Statewide Total Revenue ($)
1 - 1.5	773,930	$2.62	$2,027,697
2 - 2.5	704,137	$3.79	$2,668,678
5 - 6	497,674	$7.44	$3,702,697
Total	1,975,741		$8,399,072

D. Estimated Emissions

The use of portable fuel containers in 2007 are estimated to generate 101.5 tons of uncontrolled ROG emissions per day statewide, or approximately 74,095,000 pounds of ROG emissions per year. Table 7 summarizes the different emission categories associated with the use of portable fuel containers and their individual contribution to the 2007 statewide total. This table also shows the residential and commercial portions of the 2007 statewide estimated emissions, as well as the reduction in each category if the regulations are fully implemented.

The regulations provide an overall reduction in ROG emissions from portable fuel containers of 76.2 tons per day. As previously discussed, compliance with the proposed regulations will be accomplished primarily through attrition. Based on an implementation date of 2001 with a one year sell through and an estimated useful life for average portable fuel containers of five years, full compliance is anticipated by 2007. Therefore, the five year period beginning in 2002 and ending in 2007 should see incremental emissions reductions as the proposal moves toward full implementation.

Table 7

2007 Statewide Portable Fuel Container ROG Emissions

	Uncontrolled				
Emissions Category	Total Emissions (tons/day)	Residential Emissions (tons/day)	Commercial Emissions (tons/day)	Percent Reduction (%)	Controlled Emissions (tons/day)
Displaced Vapor	2.5	2.4	0.1	40	1.5
Transport and Storage	10.4	3.8	6.6	100	0
Spillage	8.0	7.6	0.5	100	0
Permeation	8.3	7.9	0.4	74.5	2.1
Evaporative	72.3	66.8	5.4	70	21.7
Total	101.5	88.5	13.0		25.3

Table 8 summarizes the annual effect these regulations would have on the 2007 statewide estimated emissions from portable fuel containers. The table illustrates the breakdown of residential and commercial emissions before and after implementation of the regulations. Again this table shows that the residential population contributes the bulk of the emissions associated with the use of portable fuel containers.

Table 8

2007 ROG Emissions		
	Uncontrolled Emissions (tons/day)	Controlled Emissions (tons/day)
Residential	88.5	23.5
Commercial	13.0	1.8
Total	101.5	25.3

E. Estimate of Manufacturing Costs

To determine the anticipated increase in manufacturing costs of complying portable fuel containers staff performed a comparative analysis of current retail prices. Several manufacturers produce portable fuel containers that meet the majority of the performance standards. Staff have identified two of these products that essentially comply with all of the performance standards except the permeation standard. Using estimates to quantify the most cost effective method for compliance with the permeation standard, staff were able to estimate the final retail price of a fully compliant portable fuel container. Staff then compared current retail prices of portable fuel containers with these predicted retail prices.

The Table 9 provides a summary of the cost of compliance of the regulations on an annual basis.

The $15,974,078 annual cost of compliance in 1998 assumes replacement of one-fifth of the

total statewide population of conventional portable fuel containers with spill-proof systems. The cost estimate assumes a useful life of five years for an average portable fuel container and a linear replacement of conventional containers with spill-proof systems over the same five year period. The $19,089,023 annual cost of compliance in 2007 was derived from the 1998 cost estimates assuming a 2% annual rate of inflation. The overall cost of compliance for the regulations are based on the estimated emissions in 2007 and the $19,089,023 annual cost of compliance. Staff estimate that the proposed regulations would result in annual reductions of 5,563 tons of ROG emissions. Table 10 provides a summary of the overall cost effectiveness of the proposed regulations.

Table 9

Estimated Annual Cost of Compliance (Residential and Commercial Combined)					
Container Size (gallons)	Annual Units Sold Statewide.	Estimated Retail Price Before Regulation	Estimated Retail Price After Regulation	1998 Annual Cost of Compliance ($ / year)	2007 Annual Cost of Compliance ($ / year)
1 - 1.5	773,930	$2.62	$9.00	$4,937,674	$5,900,520
2 - 2.5	704,137	$3.79	$12.00	$5,780,963	$6,908,251
5 - 6	497,674	$7.44	$18.00	$5,255,441	$6,280,252
Total	1,975,741			$15,974,078	$19,089,023

Table 10

2007 Estimated Overall Cost Effectiveness (Residential and Commercial Combined)		
Total 5 Year Cost of Compliance (total $)	Total 5 Year Emissions Reductions (tons)	Total Cost of Compliance ($ / lbs)
$95,445,115	27,815	$1.72

F. Externality Issue

Portable fuel containers, like many products, have externalities associated with their manufacture and use. Externalities are costs or benefits that are created by the manufacturing or use of a product. Externalities are caused by a market failure when the retail price of the product paid by the consumer is not the complete cost associated with the use and production of the product. In the case of a portable fuel container, if the consumer buying the container only pays for the price of manufacturing and not the costs associated with its use, others who are not using the product are forced to absorb a portion of the cleanup cost.

In the case of portable fuel containers, the externality is the cost of removal of the emissions attributed to the use of this product. The increased cost of the new containers in effect forces the users of the product to pay for the externality through higher purchase prices that will essentially eliminate or reduce container emissions. In economic terms the regulations will make the marginal private cost (MPC) equal the marginal social cost (MSC) by increasing the MPC by the amount needed to eliminate or reduce the emissions. The regulations attempt to reduce or eliminate the externalities (emissions) associated with the use of portable fuel containers. It will ensure that the users of portable fuel containers, through higher prices, pay for the reduction of the emissions attributed to their use.

G. Conclusion

The cost effectiveness numbers presented in this section are to be compared with $5 per pound of HC + NOx, which is a typical value for recent emission control activities in California, and to $11 per pound which is considered an upper threshold.

The cost of control of $1.72 per pound of ROG is below the typical value for recent emission control activities in California. Staff believe that compliance is quite cost effective, especially when viewed from the perspective that only a small percentage of a consumers' income is used to purchase a portable fuel container. This is even more apparent when we prorate the price of a portable fuel container over its estimated useful life of five years. Staff believe that the increased costs associated with the manufacturing of these new products will not severely affect manufacturers' profit margin as we anticipate these increases being passed on to the consumer.

VIII. Alternatives Considered

Staff evaluated three alternatives to the currently proposed regulations. These included:

1. No action taken.
2. Control of only one emissions category, refueling spillage.
3. Control of all emissions categories except permeation.

A. No Action

The first alternative evaluated was to take no action in the hope that compliant products would eventually find their way into the marketplace and meet with consumer acceptance. This proposal would have no impact on manufacturers as the increased costs of these products would be passed on to the consumer.

However, as previously mentioned, several products meeting most of the proposed performance standards are already available to consumers. Based on confidential sales data provided to the ARB by the manufacturers, these products currently make up only a small percentage of the total market share. Because of the increased costs of these products and the availability of inexpensive alternatives, consumers seem reluctant to purchase a spill-proof portable fuel container. Based on the sales data provided by the manufacturers staff believe that widespread

use of spill-proof containers would not occur statewide for some time, if at all. This alternative is not enforceable and the emissions reductions are not quantifiable for purposes of the SIP requirement.

B. Refueling Spillage Proposal

The second alternative evaluated is to control refueling spillage only. Staff initially sought to control refueling spillage only by implementing the automatic shut-off performance standard. The cost to comply with this proposal would be between $2.00 and $4.00 per unit to place an automatic shut-off spout on existing portable fuel containers. Again, this alternative would have no impact on manufacturers as the increased costs of these products would be passed on to the consumer.

The refueling spillage alternative would yield insufficient emissions benefits to meet California's air quality goals. As previously discussed, refueling spillage is only one of the five emissions categories associated with the use of portable fuel containers. Spouts without the automatic closure feature would be considered compliant under this proposal. Therefore, evaporative emissions and container transport and storage emissions would remain virtually unchanged. As previously mentioned, a closed container will substantially reduce evaporative emissions and eliminate transport and storage emissions. Together these emissions categories make up approximately 81% of the estimated 2007 statewide emissions attributed to portable fuel container use. Under this alternative the ARB could not achieve the emissions reductions required in the South Coast Air Basin as outlined in the previously mentioned SIP lawsuit settlement.

C. Current Proposal Without Permeation Standard

The third alternative evaluated is to move forward with the proposed regulations without the mitigation of permeation from plastic portable fuel containers. Removing the permeation standard would reduce the price of spill-proof systems by approximately 50¢ to $1.58 per unit. This alternative would have little impact on manufacturers as the decrease in manufacturing costs would likely be passed on to the consumer.

As previously mentioned, plastic portable fuel containers account for 75% of the residential container population and 69% of the commercial population. Staff have demonstrated that cost effective control strategies for the mitigation of permeation are currently available to the manufacturers. By using a barrier surface treatment on the plastic containers, approximately 75% of the emissions from permeation can be eliminated at a cost effectiveness of $0.45 per pound. This alternative was rejected by staff simply because California should seek such highly cost-effective and technically feasible emissions reductions.

D. Summary of Alternatives Evaluated

Table 5 summarizes the staff's evaluation of three alternatives to the proposal during the regulatory development process. Statewide 2007 ROG emissions are shown for comparison based

on an implementation date of January 1, 2001, a one-year sell through, and an average useful life of five years for a portable fuel container. It should be noted that the emissions presented in this comparison are in tons per day.

Table 11
Summary of Alternatives Evaluated

Alternatives Evaluated	Statewide 2007 ROG Emissions	Statewide 2010 ROG Emissions	SCAB 2010 ROG Emissions	Comment
No Action Taken	101.5	103.6	45	Inadequate Air Quality Benefit
Control of Refueling Spillage Only	93.5	95.3	41.4	Inadequate Air Quality Benefit
Current Proposal without Permeation Standard	31.6	32.2	14.0	Further Reductions Are Possible
Current Proposal (Adoption of Performance Standards)	25.4	25.9	11.2	Propose for Adoption

IX. Outstanding Issues

Staff developed and presented the concepts for the proposed regulations through several workshops and individual meetings with stakeholders. The portable fuel container and spout manufacturers have supported most areas of the proposed regulations, especially those areas that coincide with the ASTM Provisional Standards currently under development for spill resistant fueling systems. However, issues did arise as to the addition of the permeation standard and the applicable test method, the specification of a prescribed 'fill-level', the issues surrounding automatic versus manual venting of portable fuel containers, the flow rate standard and the accompanying labeling requirement, and the standard specifying only one opening for both filling and pouring. The following discussion briefly summarizes staff's current understanding of the issues.

A. Permeation

The portable fuel container manufacturers have indicated that compliance with the proposed performance standard for permeation increases the risk that consumers might face product shortages or limited product selection after the implementation date. Several manufacturers have requested that we delay the implementation of this performance standard for 12 to 18 months to give them time to develop an appropriate control strategy. As discussed in Section IV. 5.

(Permeation Standard), staff have identified several control strategies to meet the permeation standard that are currently available to the manufacturers as a post-production process in the form of a barrier surface treatment. An industry exists that currently provides barrier surface treatment services for a wide range of packaging used for consumer products and several of these companies have indicated the ability to accommodate the portable fuel container manufacturers. This provides the manufacturers a viable control strategy which is currently available while allowing them the flexibility to investigate an alternative approach. Several portable fuel container manufacturers have expressed interest in performing the treatment process on site and have raised concerns about the toxicity of the substances used to create the barrier and the recyclability of the treated products. Again, these treatments are currently in use on a wide variety of packaging for consumer products including food storage containers. These treatments leave no toxic residuals on the products so recycling should not be an issue. The treatment industry provides on site services to accommodate manufacturers who wish to incorporate these treatments in their current manufacturing processes. Both fluorination and sulfonation use closed loop self contained systems and comply with FDA regulations. In fact, several of the containers tested by staff were treated in Ontario, California.

The manufacturers have also expressed concern with the test method used to determine compliance with the permeation standard. At issue is the incorporation of a variable temperature profile rather than a steady state temperature test. The variable temperature profile was selected because portable fuel containers are generally stored outdoors and are therefore subjected to diurnal temperature conditions similar to the variable temperature profile. The manufacturers have indicated a need to self test their products and believe that the equipment necessary to duplicate the variable temperature profile is costly. Therefore, staff have committed to continue working with several manufacturers to attempt to develop a correlation between a variable temperature profile test method and a steady state temperature test method. If a correlation between these two test methods can be determined it will provide the manufacturers with a less costly way of determining compliance with the permeation standard.

B. Prescribed "Fill-Level"

The proposal specifies a prescribed "fill-level" of less than or equal to one inch below the top of the target fuel tank opening. This is to ensure that the new products fill the equipment fuel tank to the maximum extent and will avoid an increase in the incidence of refueling events caused by under-filling. Portable fuel container manufacturers have proposed increasing this prescribed level to 1.75 inches below the top of the target fuel tank. Staff have evaluated this proposal and concluded that this will lead to an increase in refueling events caused by under-filled equipment fuel tanks. Also, staff have concerns that this may lead to consumer disaffection with the new products which could result in product tampering. Several comments received by manufacturers of hand-held portable equipment indicate that their products have fill necks less than one inch in height and design requirements restrict increasing this height. They have expressed concerns that even the current specification may result in a partially filled fuel tank and have proposed changing the specification to 3/4 of an inch from the top of the target fuel tank. Staff have evaluated this proposal and determined that the one inch specification is sufficient to meet the anticipated needs of the end user. Also, since the prescribed level specifies a minimum acceptable level, it allows

manufacturers the flexibility to design products that meet the specialized needs of the hand-held market.

C. Manual Venting

Since the proposal requires containers to remain closed, these new products will at times develop positive or negative internal pressure as they are subjected to changes in ambient temperature. Prior to any refueling event these new products must be momentarily vented to allow the internal pressure to equalize with the ambient pressure. Staff have received comments concerning the possibility of consumers attempting to perform a refueling event while the portable fuel container is pressurized which could result in vapor and or fuel being discharged out of the target fuel tank. To address this issue staff evaluated two products that are currently on the market. Both incorporate an automatic shut-off feature and both have only one opening for both filling and pouring. One of these products requires the user to twist a collar on the spout which vents the container before the product can be used for a refueling event. This ensures that the container will not be pressurized when the user performs the refueling event. The second product evaluated incorporates a slide valve on the spout itself. The manufacturer specifies on the spout packaging and the spout itself that the slide valve must be manually operated prior to the refueling event to vent the attached container. Staff considered incorporating into the performance standards a specification to ensure that these new products perform the above mentioned venting automatically. This option was considered costly and because of the multitude of uses associated with these products, difficult to achieve compliance with. Staff then considered a specification to require that the product not allow the user to dispense fuel until the container was vented. As mentioned above, staff have evaluated a product that already complies with this proposed specification. However, this proposed specification would also substantially increase the cost of the new products. To determine the necessity of such a specification staff contacted a manufacturer of a manually venting spout that incorporates both automatic shut-off and automatic closure. According to the manufacturer, over the last ten years they have sold thousands of these products. During this time they have not received any consumer complaint of fuel blow-back from the target fuel tank. It would appear that the instructional labeling of the product is sufficient to ensure adequate venting of the product occurs before attempting a refueling event. Staff have concluded that further specifications with respect to the container venting issue are unnecessary.

D. Flow Rate and Flow Rate Labeling

Several manufacturers questioned the need of fuel flow requirements in the performance standards and the need to list such flow rates on a label. One manufacturer requested that staff consider adding a third fuel flow rate standard for containers used to refuel smaller equipment fuel tank Others requested no labeling requirement and instead allow the market to dictate the issue. One company said that specifying different flow rates would increase costs because several different spouts would be required. This company also was concerned about the possibility of incorrect spout usage on the part of the consumers.

Since the flow rate of a spill proof system is lower than a conventional system, staff believe

that establishing a flow rate standard is necessary to ensure that the product meets the needs of the consumer when the regulations are implemented. To help the consumer make an informed choice, the proposed regulations would require that each spill proof system or spout have a label which clearly shows the flow rate. Staff added a new flow rate standard of 0.5 gallons per minute for 1.25 gallon or smaller containers, the capacity typically used to refuel hand-held equipment. Staff recognize that producing several different spouts would be costly. However, staff believe that the consumer buys containers or spouts to fulfill a specific need. It is unlikely that a consumer would install a spout intended for a five gallon container on a one gallon container to refuel hand-held equipment.

E. One Opening for Both Filling and Pouring

Portable fuel container manufacturers stated that the one opening requirement is too restrictive. They said such a requirement would discourage innovations. The one opening requirement is needed for spouts with the automatic closure and automatic shut-off features to work correctly. Since the fuel flow rate of such spouts is less than conventional spouts, consumers would be tempted to open the secondary vent to facilitate a more rapid fuel transfer. This circumvention would result in over filling spillage. Additionally, having a second opening also allows for the potential of evaporative emissions when the container is not in use. Thus, it would be difficult to quantify the emission reductions for a system that is so dependent on the user.

Staff believe that the innovative products provision of the proposed regulations should provide the manufacturers with sufficient flexibility to improve container designs. Under this provision the Executive Officer can exempt a product from complying with all of the performance standards as long as use of the product will result in cumulative ROG emissions below the highest emitting representative spill proof system or spill proof spouts in its product category. Should a product with two openings appear in the future, the manufacturer can apply for an innovative product exemption.

X. Conclusions and Recommendation

In developing this proposed regulations for portable fuel containers, staff's goal is to achieve the greatest possible emissions reductions in a technologically feasible and cost effective manner. The proposed performance standards for spill-proof systems and spill-proof spouts are achievable using existing technologies and manufacturing processes. Some containers currently offered for sale meet most of the performance standards. The emissions reductions are cost effective when compared to recent control measures adopted by the Board. The proposed regulations are necessary to meet air quality emissions reductions goals needed to achieve health based ambient air quality standards. They may also improve water quality.

No alternatives considered by the Board would be more effective in achieving the purpose for which the regulations are proposed or would be as effective or less burdensome to affected private persons than the proposed regulations.

The ARB staff recommend that the Board adopt proposed new sections 2470 to 2478, Title 13, California Code of Regulations and Test Methods 510 to 513 incorporated by reference therein, which together would require compliance with performance standards for new portable fuel containers.

References

[1] U.S. Environmental Protection Agency, “Nonroad Engine and Vehicle Emission Study,” Report, prepared by Office of Air and Radiation, November 1991

[2] Phillips 66 Company, “Interim Permeation Study Results,” Report, prepared by Plastics Division of Phillips Petroleum Company, August 1992

[3] Phillips Petroleum Company, “Determination of Fuel Loss from High Density Polyethylene Jerry Cans,” Report, W.C. Dillard and D.L. Peters, June 1999

[4] California Air Resources Board, “Test Protocol and Results for the Determination of Permeation Rates from High Density Polyethylene Containers and Barrier Surface Treatment Feasibility Study,” Report, prepared by Monitoring and Laboratory Division, May 1999

[5] Dow Chemical Company, “Gasoline Barrier and Physical Property Retention of Surface Sulfonated HDPE Bottles After Five Years Exposure to Gasoline,” Report, prepared by L. S. Thomas and R. A. Mills, January, 1976`

[6] Title 29, Code of Federal Regulations, Part 1926, sections 150-155

Appendix A

Proposed Portable Fuel Container Spillage Control Regulations

Appendix B

Test Methods Proposed for Incorporation by Reference in the Regulations