PARAFFIN: PRACTICAL YET PERILOUS
A Look at the Risks and Health Concerns of Paraffin Use in South Africa

by

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Acknowledgments

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Abstract

Socio-economic conditions force millions of South Africans to depend on illuminating paraffin as a household energy source. This project investigates the dangers and risks associated with domestic use of paraffin and paraffin appliances. In addition, this study attempts to understand the primary causes of paraffin-related incidents and what must be done to reduce or eliminate these causes.

In order to develop a broad knowledge base on paraffin issues I looked at scientific studies, research data, and educational materials on paraffin, paraffin appliances, and paraffin-related incidents. To obtain an in-depth understanding of these issues, I conducted interviews with professionals from a variety of NGOs and with an individual from the City of Cape Town Disaster Risk Management Center. In addition, I interviewed residents from the informal settlement of Joe Slovo in order to learn about their personal experiences with paraffin and paraffin appliances.

This paper concludes that the unregulated sale of dangerous paraffin stoves and the absence of appropriate paraffin packaging are two significant factors contributing to the thousands of paraffin-related incidents in South Africa each year. Government and industry must take swift action to make these products safer for the millions of South Africans that depend on them for their everyday household energy needs.

Glossary

CRCs- child-resistant closures

NGOs- non-government organizations

PSASA- Paraffin Safety Association of Southern Africa

SAPIA- South African Petroleum Industry Association

SABS- South African Bureau of Standards

SANS- South African National Standards

VOCs- volatile organic compounds

Introduction

Every day, South Africans depend on a variety of energy sources for their household energy needs such as cooking, heating, and lighting. “Illuminating paraffin is the most commonly used and purchased fuel source for low-income communities throughout the country and is used to some degree by almost half of all South African homes,” according to the Paraffin Safety Association of Southern Africa’s PSASA's *Experts Forum Report* (PSASA, 2004b:9). With nearly half of all South Africans (approximately 17-20 million people) using paraffin as a source of energy in their homes, paraffin-related incidents and health concerns are having enormous impacts on the lifestyles and well-being of the citizens of this country. In addition, the ramifications of paraffin-related incidents extend far beyond just paraffin users themselves; an estimated R104 billion is spent each year on health and disaster relief as a result of paraffin-related incidents (Kruger, 2005:1).

This study investigates the dangers and risks associated with domestic use of paraffin and paraffin appliances. Additionally, this project aims to examine paraffin-related incidents and health concerns, the efforts that are being made to address these issues, and what is still needed to reduce the risks and harm associated with paraffin usage.

This paper consists of four main sections. The first section focuses on identifying who the primary users of paraffin are in South Africa, and what their reasons are for using paraffin. The second section aims to shed light on paraffin-related incidents and health concerns and the primary causes of these problems. The third section looks at the various ways in which the government, non-governmental organizations (NGOs), communities, and various other entities are working to address these numerous paraffin-related issues. The fourth section of this paper discusses the need for more government intervention and involvement in regulating the

production and sale of paraffin and paraffin appliances in order to aid these organizations and entities in their goal of reducing the risks and harms of paraffin usage in South Africa.

While I was able to gain a great deal of information on the many causes of paraffin-related incidents and health concerns during the three weeks of my independent study project, I realize that the short duration of my research limited my ability to fully understand all of the complexities and factors involved in paraffin-related incidents, the efforts being made to address these problems, and the ways in which these issues can best be addressed. The minimal amounts of prior research conducted on paraffin usage and paraffin-related incidents also limited my ability to gain a broader understanding of these issues in the country and forced me to depend on smaller case studies and research data. Additionally, the relative newness of many of the programs and projects that have been developed to address paraffin-related issues made it difficult to analyze and evaluate the effectiveness and impact of these programs. Lastly, due to the limited number of organizations dedicated to paraffin and/or paraffin-related issues, I had to depend on the Paraffin Safety Association of Southern Africa (PSASA) for a significant percentage of my data and information. Having said this, through my research of available literature on paraffin-related issues and interviews with key stakeholders, I believe this study develops accurate and meaningful conclusions on paraffin issues in South Africa and what is needed in order to reduce the overwhelming number of paraffin-related incidents in this country.

Interviews with professionals from a variety of NGOs, such as the Development Action Group, the Phoenix Burn Project, and PSASA, in addition to an interview with an individual from the City of Cape Town's Disaster Risk Management Center are the primary sources that provide this study with an understanding of the efforts that are being made by various organizations and institutions to address the current dangers associated with paraffin use.

Additionally, interviews with residents from the Joe Slovo informal settlement provide this study with firsthand experiences with paraffin and paraffin appliances.

Scientific studies, surveys, and case studies were a large percentage of the secondary sources that provided this project with necessary research data. Educational materials and a number of more in-depth reports commissioned by PSASA offered this study a broad understanding of the many dangers and health concerns related to the domestic use of paraffin.

Who is Using Paraffin and Why

According to the South African Petroleum Industry Association's (SAPIA) 2003 Annual Report, 769 million liters of paraffin were sold in South Africa in 2003 (Kruger, 2005:4). Of the approximately five million households in South Africa currently using fossil fuels for domestic purposes, a large proportion rely on paraffin, "with 21 percent using it for cooking, 14 percent for heating and 13 percent for lighting" (Muller, 2003:2015). PSASA's *Synopsis on Illuminating Paraffin* suggests that it is primarily "poverty and related socio-economic factors" that continue to force such a large percentage of South Africans to "rely on paraffin for some part, if not all, of their domestic energy requirements" (Kruger, 2005:10).

The small amounts in which paraffin can be purchased and the ease with which one can access it are two important factors in the widespread use of this fuel amongst low-income households and in informal settlements. Electricity, for instance, can only be purchased in set price values, such as R40 or R100, and is often only sold at larger shopping centers. In turn, one must not only save up to buy an electricity voucher, but must also find transportation to go and purchase it. Furthermore, while LP gas "is economic only when purchased in full tanks" (Howells et al., 2005:1835), paraffin can be purchased for the same low price in any quantity,

from a small cup full to a 20 liter drum (Seti, 2007). This is particularly important since many households in informal settlements have very low and sporadic incomes, and often cannot afford to buy items such as fuel in bulk, but rather buy it in small increments with what money they have available to them at that time. "With paraffin, if you have just a few rand you can go and buy a liter at the garage[1] or spaza shop[2]" (Seti, 2007).

In four interviews with Joe Slovo residents, I found that residents were paying an average of R6 per liter of paraffin at the nearest garage. This price was slightly cheaper than at the closer, more conveniently located local spaza shop, where they often purchased their paraffin. They stated that on average they used about 5 liters per week during the warmer summer months, and up to twice that much during the colder winter months when paraffin is used for heating their homes (Figlan, Nini, Seti, Ncukana, 2007). These figures are comparable to those found in PSASA's *Synopsis of Illuminating Paraffin*, which cites studies showing that the average household uses approximately 20 liters of paraffin per month during the summer and about 47 liters per month during the winter (Kruger, 2005:6).

In an interview, Joe Slovo resident Thandeka Seti stated that she believes electricity is cheaper than paraffin. Seti had electricity in her home from 2001 until 2006, when people began cutting and stealing the electrical lines in order to sell them in illegal scrap yards. She claimed that she spent far less on her household energy when she was using electricity than she does now using paraffin for all of her energy needs. She stated that particularly for purposes such as lighting and heating, she believed electricity was far more efficient, and ultimately much cheaper (Seti, 2007). Another Joe Slovo resident, Nomakhaka Nini uses electricity for lighting and for her sewing machine, which she uses to make dresses and skirts for sale. For most of her cooking

[1] garage- South African term for gas station.
[2] spaza shop- small convenience stores most often found in South African townships, which sell everyday household goods.

and heating, however, she continues to use paraffin. Nini stated that if electrical appliances were more affordable, she would stop using paraffin entirely for she believes that electricity is better for cost and safety reasons (Nini, 2007).

In contrast to some of these residents' belief in the cost efficiency of electricity, PSASA's *Synopsis of Illuminating Paraffin*, states that recent studies have shown that the average cost to boil 2 liters of water using electricity is 20 cents, using LP gas is 25 cents, and using paraffin is 13 cents (Kruger, 2005:6). All of the residents that I interviewed in Joe Slovo stated that they had been using their current paraffin stoves for an average of 10-12 months, and since most wick non-pressure stoves only function properly for three to five months (Swart, 2007) it is possible that their stoves are no longer working as efficiently as they should be and are in turn using larger amounts of paraffin to complete routine household chores such as boiling water and heating.

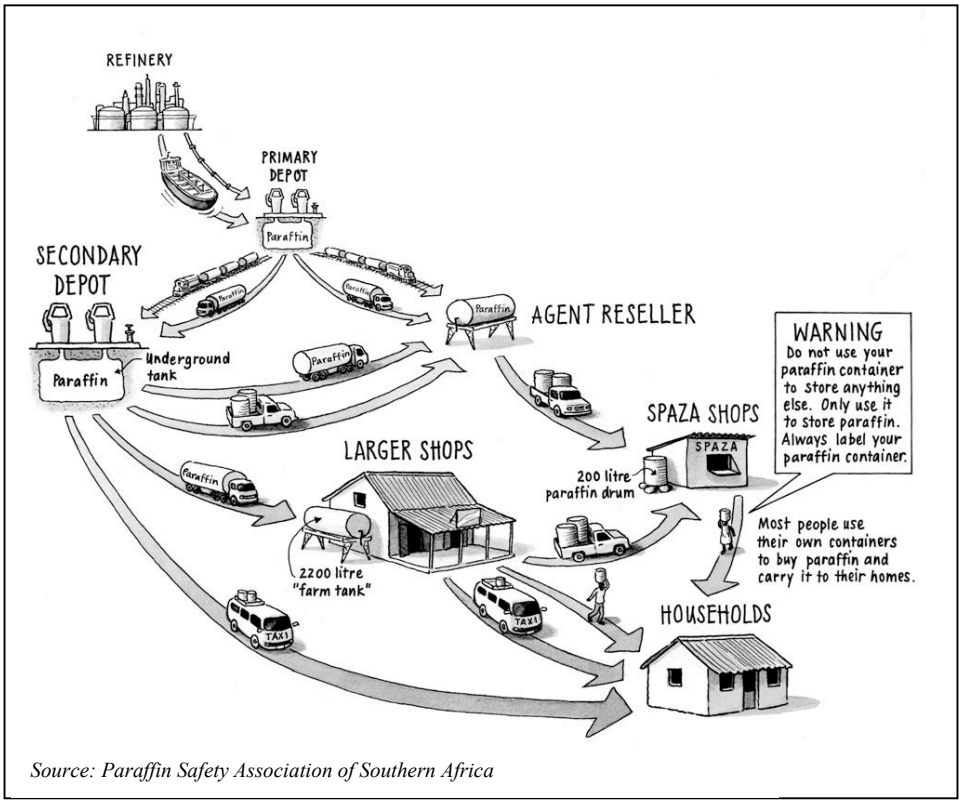
Based on other surveys and research data I examined, I believe that the overwhelming majority of paraffin users list the low cost of paraffin as one of the primary reasons they use paraffin, and the relatively high cost of electricity as one of the primary reasons they do not use electricity for all of their energy needs. Furthermore, based on a variety of factors, the greater majority of households depend on multiple forms of energy, which they choose to use for different purposes and for different reasons (Panday and Mafu, 2007).

Problems and Health Concerns for Paraffin Users:

Packaging and Distribution of Paraffin

The unregulated production and sale of paraffin is one of the leading causes of paraffin-related incidents (Swart, 2007). As shown in the illustration below, the supply and distribution of

paraffin often involves a very lengthy chain, during which it will be transported, sold and resold a number of times between the refinery and its final sale to residential consumers.



Source: Paraffin Safety Association of Southern Africa

In this process, paraffin often becomes contaminated with various other chemicals and particles (Swart, 2007). Furthermore, the overwhelming majority of paraffin is sold in small lots, where consumers bring any type of bottle or container, often cool drink[3] or juice bottles, to their local spaza shop or garage and buy paraffin in whatever quantity they wish. These containers are often used for a variety of purposes in the household, and in turn can be contaminated with substances such as petrol, which when mixed with paraffin create a more flammable and dangerous liquid (Swart, 2007).

Since consumers generally use their own containers and bottles to purchase and store their paraffin, a majority of paraffin is stored in inadequately labeled containers. In addition to

[3] cool drink- South African term for soft drinks and similar beverages.

lacking appropriate safety warnings and labels, these containers are also very easily confused with other juice and cool drink bottles. Furthermore, most of these containers lack child-resistant safety caps (CRCs), which are essential in reducing the risk of accidental ingestions by young children (Matzopoulos et al., 2007).

A tragic story of a thirteen-year-old boy babysitting his two younger brothers illustrates the need for the prepackaging of paraffin in appropriately labeled containers. While babysitting, the thirteen-year-old's younger brothers started a small fire on the shack floor, and the thirteen year old raced to put it out with what he thought was a bottle of water, but was actually a bottle of paraffin. One of the younger brothers died instantly, and the other died a few weeks later from severe burns (Martinez, 2007). Terrifying accidents such as these are completely unnecessary and are the reason why all paraffin needs to be sold in clearly marked paraffin containers with CRCs.

Paraffin Ingestions

Between 40,000-60,000 children in South Africa suffer from paraffin ingestion and poisoning annually. Each year, between 171 and 498 of the children treated in South African hospitals cannot be saved. The actual number of child deaths from paraffin poisoning may be far greater, however, since many serious cases never reach a health care facility for treatment (Matzopoulos et al, 2007). These high rates of paraffin ingestion are largely due to the previously mentioned manner in which paraffin is sold and stored.

"Young children are highly likely to mistake paraffin for water or cool drink as it is a colorless liquid often stored at ground level in cool drink bottles" (Panday and Mafu, 2007). In addition, higher numbers of ingestions take place during the summer months when children tend to be thirsty more often (Panday and Mafu, 2007). While paraffin ingestion rarely results in

death, only 1 ml of paraffin "is required to produce complications through chemical pneumonitis, pneumonia and other respiratory complications. These complications often result when paraffin is aspirated into the lungs, sometimes through induced vomiting" (Panday and Mafu, 2007).

In an interview, Joe Slovo resident Zanele Figlan, stated, "Paraffin is too dangerous. Some people can die because of paraffin" (Figlan, 2007). Figlan spoke of how she learned the hard way to keep her paraffin stored properly when one of her sons swallowed paraffin at the age of two. Luckily, she was able to get her son to a nearby clinic where he received immediate medical attention and was able to recover fully. Figlan said she has learned how dangerous paraffin is for children and she now keeps her paraffin in a locked cupboard at all times (Figlan, 2007).

Inhalation of Pollutants

A study conducted in 1998 showed that an average of 33 percent of households using paraffin had members with "acute lower respiratory infection, with pneumonia and bronchiolitis being the most common ailments" (Muller, 2003:2016). According to the World Health Organization (WHO), "Between 1997 and 1999, acute lower respiratory infections were the leading cause of mortality from infectious diseases, with an estimated 3.5-4.0 million annual deaths worldwide, mostly in developing countries" (Ezzati and Kammen, 2002:815). In South Africa in particular, "the second highest cause of infant mortality…is respiratory disease, of which the major cause is indoor air pollution from fuel burning" (Howells et al., 2005:1835). Tests on the most popular paraffin stoves showed that high levels of pollutants are emitted during normal and regular use, and "this is exacerbated through the continued use of appliances that have deteriorated in quality and efficiency over time, resulting in incomplete combustion

and the production of copious amounts of carbon monoxide and other particulate matter" (Panday and Mafu, 2007).

"Pollutants emitted during [paraffin] combustion include carbon monoxide, carbon dioxide, sulphur dioxide, nitrogen dioxide, particulate matter, formaldehyde and various hydrocarbons or volatile organic compounds (VOCs). As a consequence, there are many potential health effects associated with [paraffin] usage" (Muller, 2003:2016). A study conducted in 2003 targeted three of these pollutants for investigation – nitrogen dioxide, benzene, and toluene – and found that nitrogen dioxide "is known to affect both the respiratory and immune systems… [and] can lead to an alteration in the immune function, causing more rapid onset of diseases such as HIV/AIDS and increased susceptibility to viral and bacterial infection" (Muller, 2003:2016). Benzene is a VOC that most commonly enters the body through inhalation and "causes neurological effects such as drowsiness, dizziness, rapid heart beat, tremors, headaches, confusion, and sometimes unconsciousness" (Muller, 2003:2016). Furthermore, benzene is carcinogenic and "can lead to various types of anemia as well as leukemia" (Muller, 2006:2016). Toluene is yet another VOC that enters the body through inhalation, and "chronic exposure to toluene is associated with severe central nervous system damage and impaired liver and kidney function" (Muller, 2006:2016).

In the interviews I conducted with residents from Joe Slovo, all four residents complained of the fumes and smoke produced by their paraffin appliances. Two of the residents reported that they often became very dizzy, light-headed and/or short of breath when using their paraffin stoves for extended periods of time (Figlan, Nini, 2007).

Paraffin Stoves

At the core of the inhalation problems previously discussed are unsafe, inefficient, and outdated paraffin stoves. "In a series of tests conducted on the country's most widely bought stoves, Test House found that six out of nine stoves tested emitted between two and four times more than the amounts of carbon monoxide deemed safe by the SABS [South African Bureau of Standards]" (PSASA, 2003b). Another large concern with paraffin stoves today is the way in which the majority of them literally explode into flames when knocked over, earning them the nickname of firebomb stoves (Swart, 2007).

> All that's needed to start a devastating fire in one of South Africa's informal settlements is for a paraffin stove to be knocked over. Sadly, but perhaps not surprisingly, given that most corrugated iron and cardboard dwellings are constructed on land best described as bumpy, this happens on a wide scale. Under these circumstances, all it takes to send a stove toppling is a sudden gust of wind through a draughty window or door…a swinging arm in a confined space…a children's game…or even an inquisitive toddler. And yet, it would be wrong to blame the havoc caused by the more than 40,000 fires that break out in informal settlements every year on a bumpy landscape or a rickety dwelling. The real culprit for the death and destruction is, paradoxically, a household utensil that is regarded as essential among the country's poorest communities – a paraffin stove (PSASA, 2003c).

According to PSASA's *Synopsis of Illuminating Paraffin*:

> In 2003, PSASA commissioned a series of tests on the nine best-selling paraffin stoves in South Africa. All had serious problems. Every wick-based or non-pressure stove immediately burst into flames when knocked over. Five leaked paraffin when lying on their sides. Some even leaked paraffin during normal use. The tests also found that in some instances the temperature of the fuel in the reservoir exceeded 80 degrees Celsius, well above the minimum 43 degree flashpoint[4] of paraffin. In addition, most stoves were sold without any or adequate instructions on its safe use and maintenance (Kruger, 2005:1).

[4] Flashpoint- "the lowest temperature at which the vapors given off by a volatile liquid will burst into flame when approached by a flame" (www.webster-dictionary.net, 2007).

Each of the residents that I interviewed in Joe Slovo stated that they had never received any kind of instructions or safety materials with any of the paraffin appliances they had bought over the years (Figlan, Nini, Seti, Ncukana, 2007). In addition, they agreed that the extraordinary number of risks and dangers associated with the use of paraffin appliances means that detailed instructions and pictures should be provided with every paraffin stove or heater on the market, and that these instructions should explain the correct and incorrect ways to use the appliance and also the precautions that should be taken when using it.

Fires and Burns

On January 16, 2005 over 12,000 people were left homeless after a devastating fire tore through the informal settlement of Joe Slovo. "One of the residents claimed the fire was started by a man who had left a paraffin stove unattended as he took a nap" (Mtyala, 2005). In total, the fires affected approximately 3,150 families, leaving seven people, including two children, severely injured from the fires and one infant dead from smoke inhalation (Mtyala, 2005). Fires such as these are becoming a more common occurrence as informal settlements become increasingly overcrowded and as many low-income households continue to depend on dangerous energy sources for their cooking, heating, and lighting.

Between 1998 and 2000, there was a "staggering 100% increase in the densification of some informal settlements" in Cape Town and surrounding areas (Kruger, 2005:12). This influx of people into areas already lacking in resources has been problematic in a variety of ways. Due to the limited amount of available space in these informal settlements, incoming populations are building their shacks in the small and narrow spaces between existing shacks. This creates long rows of shacks with little to no spatial separation. The close proximity of these shacks,

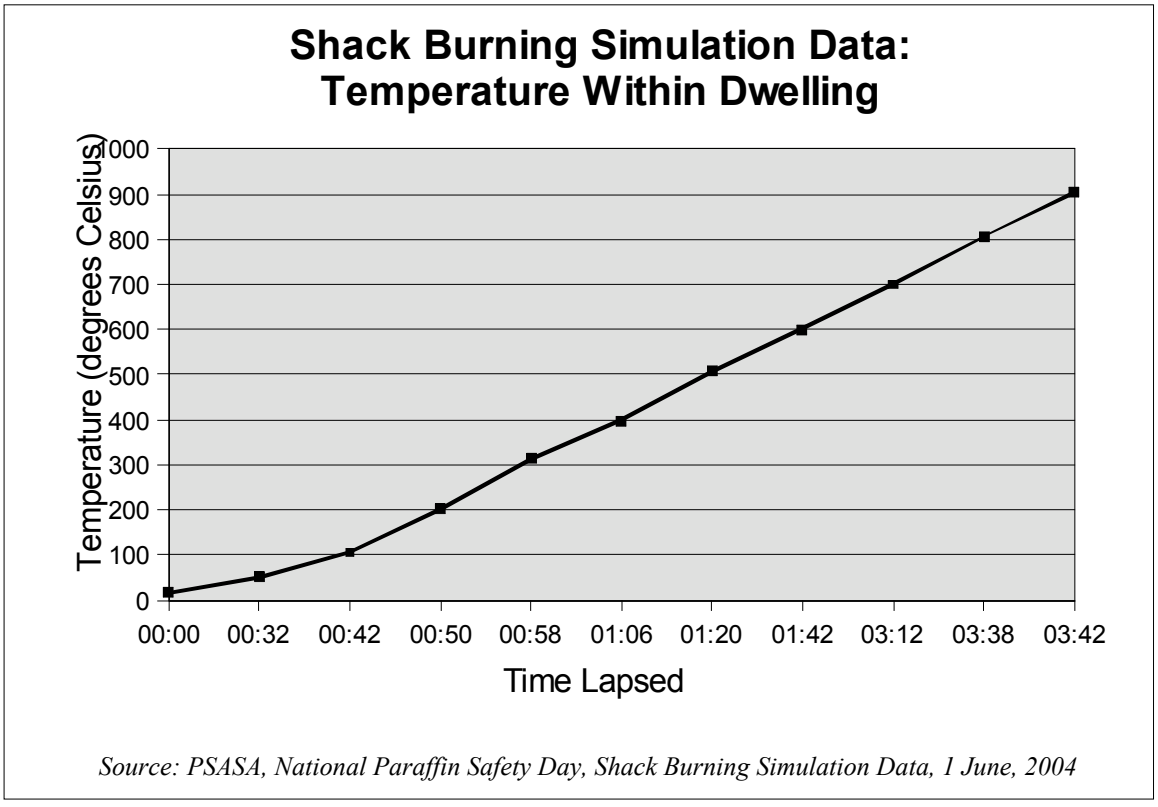
combined with the fact that shacks are often constructed of highly flammable materials, such as wood and cardboard, means that even the smallest of fires can spread rapidly throughout entire settlements in a very short period of time.

"In 2005, the City of Cape Town alone reported 1,327 informal settlement fires resulting in 8,693 dwellings being affected and a total of 112 deaths. A report to treasury in 2003 estimated the total annual externality cost of using paraffin, [calculated at roughly R94 billion in 2005], to be 50 times higher than the annual turnover in paraffin sales" (PSASA, 2006:1). While the exact cause of many of these fires cannot be formally verified, "the most common fire causes cited were paraffin stoves exploding (52 percent) and paraffin stoves knocked over (42 percent)" (PSASA, 2006:1).

It is estimated that each year South Africa experiences more than 46,000 paraffin-related fires, with the greater majority of them occurring in low-income households (Panday and Mafu, 2007:21). Studies and surveys conducted by PSASA showed that there are fires occurring year round in informal settlements, with an increase in frequency during the winter months (Panday and Mafu, 2007:22). According to Johan Minnie, Manager of Public Preparedness and Awareness for the City of Cape Town Disaster Risk Management Centre, while fire services must officially report the cause of every fire, the actual cause of the majority of fires is not able to be determined and/or is not adequately investigated. Minnie states that this is due to fire services being severely understaffed and under-resourced. He also stated, however, that while there is often not official evidence of the cause of the fire, they often find that local residents and community members know or have a general idea of the cause of the fire (Minnie, 2007).

PSASA conducted four shack-fire simulations on National Paraffin Safety Day on June 1, 2004. For the simulation, a non-pressure paraffin stove was used to heat a pot of water for one

hour inside of a typical, furnished, single room informal dwelling. Having been in use for one hour, the paraffin stove was then knocked over and the results were monitored and video recorded. In each simulation the stove immediately burst into flames upon being knocked over, and the temperature inside the shack was measured as the fire spread rapidly. The chart on the following page illustrates this rapid increase in temperature within the dwelling over a very short period of time. Within 32 seconds the temperature inside the shack had already reached 52 ºC, and within 50 seconds the temperature had risen to 202 ºC. In less than a minute and a half the temperature inside the shack had reached 507 ºC and within less than four minutes it reached a blazing 904 ºC (Kruger, 2005:6-7). "Generally, occupants have less than a minute from the time a stove is knocked over to the point at which the fire in the structure will kill anyone inside"(Smook, 2005:2).



Source: PSASA, National Paraffin Safety Day, Shack Burning Simulation Data, 1 June, 2004

According to *A Profile of Fatal Injuries in South Africa: Fifth Annual Report 2003,* burns were the number one external cause of death[5] for children under the age of one. For children between the ages of one and fourteen, burns were the third highest external cause of death after pedestrian deaths and drowning (Matzopoulos, 2004:ix). The greatest percentage of burn injuries generally occur with children ages five and under, "because children this age are more accident prone and are unaware of the dangers associated with energy sources and appliances" (Martinez, 2007).

Although there are estimates of the percentages of these burns caused by paraffin-related incidents, there has never been any official system for collecting data at hospitals or clinics that links burns to the energy sources that cause them (Swart, 2006). While many burn incidents result in fatalities, there are also thousands of children in South Africa who survive burn incidents, but sustain serious injuries.

> Many of these children are treated for "full thickness" burns, where both the outer layer of the skin and the inner layer have been destroyed, causing severe scarring and, sometimes, even death. Children with serious burns will usually require a series of operations to treat the disfigurement brought about by scarring. But, generally, these operations are an option only for the rich. Children in informal settlements are forced to carry their scars for the rest of their lives. Scar tissue does not grow, causing severe difficulty for child burn survivors whose bones are growing. This is especially so for severe burns on the head as the skull grows (PSASA, 2003a).

Teri Kruger, Senior Manager of the Safe Appliances Project as PSASA, states:

> We know that it generally costs around R35 000 to treat a single burn victim and that the costs of treating burns go far beyond the initial regimen of caring for the wounds. Aftercare, physiotherapy**,** reconstructive surgery; re-training and reintegration into the community and so on aren't counted as part of treating the burns, which they ought to be. What this means is that the impact of burns on our society and economy is being

[5] external cause of death- "the mechanism, circumstance or event that preceded the death. Examples of the external cause of death include firearms, stabbing, motor vehicle collisions, drowning, burns and poisonings, all of which may result in injury and eventually death" (Matzopoulos, 2004:viii).

> underestimated and as a result not enough resources are being allocated to address the problem (Smook, 2005:1).

Limited Awareness and Knowledge on Paraffin Safety

In the four interviews I conducted in Joe Slovo, all four residents reported that they had never received any kind of paraffin safety information. Not only had they never received educational brochures or materials from organizations such as PSASA, but they had also never seen or been given any type of safety information or instructions when they purchased their paraffin and their paraffin appliances. They all stated that the only safety information that they did have was gained through personal experiences or through the experiences of friends or neighbors (Figlan, Nini, Seti, Ncukana, 2007).

When asked how they would respond to a fire caused by a paraffin stove or heater, three of them responded that they would use water to put it out (Figlan, Nini, Seti, Ncukana, 2007). Only one of the residents was aware that since paraffin is oil, putting water on a paraffin fire can often make it worse by causing the oil to spread further. This resident was well informed and stated that he knew that dirt and/or sand was the best thing to use for a paraffin fire (Ncukana, 2007). Furthermore, when asked how they would respond to a child swallowing paraffin, all four residents stated that they would first give the child milk and then take them to a clinic. Two of the residents stated that they might have the child vomit first. While they all understood that the child should be taken to the clinic as quickly as possible, none of them were aware of the negative consequences of having the child vomit and/or giving them something to eat or drink. Furthermore, upon showing these residents PSASA's list of paraffin safety rules (see Appendix 1) I discovered that they also had little knowledge of many basic safety and emergency response

practices, including burn treatment, what to do in the case of a fire, and the importance of proper ventilation in order to avoid respiratory problems (Figlan, Nini, Seti, Ncukana, 2007).

Responses to Paraffin Issues

In 1994 the petroleum industry and "the then government-in-waiting" held a meeting wherein African National Congress (ANC) delegates raised concerns about the various health risks of paraffin (Haw, 2007:34). Ultimately, the PSASA was formed in 1996 as a response to the overwhelming number of paraffin-related incidents and illnesses that occur each year in South Africa. "It is funded by the South African Petroleum Industry Association (SAPIA), which is made up of the country's 'big six' petroleum companies—BP, Caltex, Engen, Sasol, Shell and Total" (Haw, 2007:34). The vision of PSASA is "to establish South Africa as the world leader in paraffin and energy safety" (PSASA, 2004a:6). They aim to achieve this through "research, education, standards, packaging and safe appliances" (PSASA, 2004b:8).

Surveillance and Research

According to their website, PSASA is currently "in the process of developing and launching a Geographical Information System (GIS) based surveillance system...in an effort to better understand the nature, occurrence and frequency of paraffin related incidents" in South Africa (PSASA, 2007e). "This system is primarily to be used as a tool: to collect information about paraffin usage and harmful paraffin-related incidents occurring across the country, to monitor and analyze the usage and incidents, and to monitor and evaluate any interventions related to paraffin safety that are undertaken by the Paraffin Safety Association" (PSASA, 2007e).

Dehran Swart, Senior Project Manager at PSASA, stated that one of the primary reasons for the surveillance system is because PSASA strongly believes that, "Whatever we do should be based on evidence" (Swart, 2007). In turn, PSASA hopes that the information and data collected through the GIS based surveillance system will help them to better direct their programs, time, and resources to those areas where they are most needed. In addition to being more accurate in its own research and interventions, PSASA hopes that "other disaster organization management interventions might benefit from the system" (PSASA, 2007e). Swart stated that as part of their surveillance system, PSASA has established data collection programs at 10 different clinics across the country, where they are currently monitoring and collecting data about harmful incidents related to paraffin and other energy sources, including, but not limited to, burns, ingestions, and deaths (Swart, 2007). PSASA is working to establish additional data collection programs at a number of other hospitals and clinics, but there are many challenges to doing this. According to Swart, most hospitals and clinics are understaffed and overworked, and have little time, energy, or resources to devote to such data collection (Swart, 2007).

Education and Services

Since its establishment, PSASA has been working to develop and implement energy safety and awareness programs in communities and schools across the country. As a small non-profit organization, however, it depends on collaboration with government, other NGOs, corporations, emergency services, medical personnel, schools, and community members to help its messages and programs to reach all citizens throughout the country (Swart, 2007).

In 2004, PSASA created eleven educational posters about energy and paraffin safety. These posters were translated into all eleven official languages and have been used for education

and training across the country. In addition, they developed a sixty-four page training handbook, which was translated into five languages. This handbook provides extensive energy safety information on issues such as how and where to safely store paraffin, how to use child resistant safety caps, what to do if a child swallows paraffin and other necessary and practical safety information relating to household energy use. In order for these educational materials to be best utilized and most effective, PSASA has developed a "train the trainer" community education strategy. This strategy consists of master trainers training leaders in communities and other organizations, so that those leaders can then teach the same messages to larger groups of people in their own communities (Swart, 2007).

According to Swart, PSASA has also developed paraffin and energy safety curriculum for grade R and grade 7, and aim to eventually develop curriculum that will be taught at all grade levels in schools across the country (Swart, 2007). These curriculums focus on teaching children about the necessary safety precautions that must be observed when using or when near energy sources or appliances, and other important information on the prevention of and reaction to energy-related incidents (Swart, 2007).

Felicity Mbambani, Regional Assistant of the Southern Region at PSASA, stated that PSASA is currently running a series of radio broadcasts to inform local communities about paraffin safety issues and to open up a channel for community members to ask questions and have dialogues about paraffin-related issues. Each week the broadcast will feature a new topic or issue relating to paraffin and energy safety, and during some of the broadcasts listeners will have the opportunity to call in and asks questions of one of PSASA's staff members (Mbambani, 2007).

The Phoenix Burn Project was established in 2006 in order to support the work of the Burns Unit at the Red Cross Children's Hospital in Cape Town (Martinez, 2007) According to their website, the Phoenix Burn Project's main goals are to "advocate for the rights of burn survivors, promote awareness and prevention of burn injuries, and facilitate rehabilitation and social reintegration of burn survivors" (Phoenix Burn Project, 2007). In an interview with Dr. Peter Martinez, President and Founder of the Phoenix Burn Project, Martinez said that there are few programs or services available to burn survivors. "Rehabilitation for burns injuries is a process that takes years and in some cases a lifetime" (Martinez, 2007). Martinez said there was a large need for community-based support for these people, which ultimately inspired the creation of the Phoenix Burn Project.

One project that the Phoenix Burn Project has developed is the provision of educational materials on burn treatment and care for the parents of burn survivors. Martinez stated that most hospitals are understaffed and overloaded with patients, and in turn the parents of burn survivors often receive little information on how appropriately to treat their child's burns and the importance of follow-up visits. In addition, even if they are spoken to about some of these issues, parents are often too distressed or traumatized to really understand or remember the information communicated to them. Thus, the Phoenix Burn Project created educational brochures that parents can both read in the waiting room and take home with them in order to best remember and be informed on the appropriate treatment of their child's wounds (Martinez, 2007).

Another project that the Phoenix Burn Project has already established and implemented is the soft toy project. The soft toy project provides child burn survivors with a soft toy each time they return to the hospital for follow-up treatments for their burns. Martinez said that burn victims often require several follow-up visits and treatments in order for their burns and wounds

to properly heal. Since many burn patients come from low-income households, many parents find it difficult to take the time off work and/or find the transportation to get their children to all of these follow-up visits. Furthermore, these treatments are often painful and thus children are generally reluctant to return to the hospital. Martinez said that thus far the soft toy project has been successful in encouraging children to complete their follow-up visits. In addition, Martinez said that the Phoenix Burn Project is looking at developing a program to provide transport services to help parents and children get to and from these follow-up visits (Martinez, 2007).

Policy and Legislation

In December 2005, the Department of Trade and Industry developed a "proposed compulsory specification for non-pressure paraffin stoves and heaters" (Department of Trade and Industry, 2005:11). This proposed policy required that all non-pressure paraffin stoves and heaters comply with the requirements of SANS (South African National Standards) 1906:2005 Edition 2 *Non-pressure paraffin stoves and heaters* in addition to a number of amendments. These amendments included such requirements as "no leakage of fuel in the event of the stove being knocked over", "the appliance shall extinguish itself within 30 seconds, if it is knocked over", and "once extinguished the appliance shall not emit visible smoke for more than one minute" (Department of Trade and Industry, 2005:11-12).

According to a press release by PSASA on March 16, 2007, the Minister of the Department of Trade and Industry, Mr. Mandisi Mphahlwa, "had regulated the SANS 1906:2006 Edition 2:1 (see Appendix 2) standard in 2006 with effect from 1 January 2007. This means that only paraffin wick stoves and heaters that pass the now compulsory SANS 1906 safety standard can legally be sold in South Africa" (PSASA, 2007c:1). Unfortunately, there is still no model of

paraffin wick stove or heater that has been tested by SABS and passed the standard. In turn, there are no legal, wick-based paraffin stoves or heaters on the South African market, and "stoves that do not meet the SANS 1906 safety specification, the cheapest and most dangerous stoves, are freely available countrywide from large chain stores to street vendors for just under R30" (PSASA, 2007c:1). "Moeletsi made it clear to manufacturers and suppliers that they have been informed about the regulation well ahead of time and there is no doubt that if their non-compliant appliances are still on the market, they are in breach of this regulation" (PSASA, 2007c:1). In response to the passing of the new SANS 1906 policy, Patrick Kulati the Managing Director of the Paraffin Safety Association said:

> "We applaud the DTI and SABS for the bold stand they are making for the consumer. We are naturally concerned about the unsafe stoves that are already in households as well as the fact that a vacuum is being created in the market for the lower cost appliances because no wick based paraffin appliance has yet passed the SANS 1906 specifications. We hope that the industry will rise to the challenge and unlock the opportunity to introduce SANS1906 compliant products as soon as possible. We once again call upon all stakeholders in industry, government and civil society to work together to ensure that a safe paraffin based household energy system becomes a reality sooner rather than later" (PSASA, 2007:2).

Along with policy and legislation for safer paraffin appliances, PSASA is continuously advocating for the mandatory packaging of all paraffin. According to Swart, these efforts have met with little success thus far as the corporations insist that these standards must first be government mandated, while government argues that the petroleum industry should be self-regulating. The problem with industries self-regulating, however, is that even if two or three of the petroleum companies decide to go ahead and start packaging all of their paraffin, they will not be able to remain competitive with the other petroleum companies that continue to sell paraffin in bulk (Swart, 2007). In an effort to try and address some of these issues, PSASA developed the Kleena Paraffin Project, which distributed hundreds of clearly marked paraffin

containers with safety warnings and symbols, and CRCs to paraffin users to be used solely for the purchasing and storing of paraffin (Swart, 2007). While this project helps to address issues such as the need for CRCs on all paraffin storage devices, it does not completely eliminate the risk of the contamination of paraffin along the supply route. In turn, this project should be seen as a temporary method of addressing paraffin packaging issues, and not a replacement to the mandatory legislation for all paraffin to be prepackaged in safe containers.

Lastly, while the Phoenix Burn Project is still very new, it has already been largely successful in raising awareness about issues concerning burn survivors and their rights, according to Martinez. In addition, this year the Phoenix Burn Project organized a Burns Forum, where different stakeholders in the burns arena were able to come together for the first time. Martinez said the Forum was a great success and helped to establish connections and partnerships between various stakeholders, which will allow them to more effectively address burns-related issues and concerns in the future (Martinez, 2007).

Conclusions and Recommendations

Chapter 2, Section 24, of the Bill of Rights in the Constitution of South Africa states that, "Everyone has the right to an environment that is not harmful to their health and well-being" (1996). Each year, millions of South Africans are denied this fundamental right due to the various socio-economic factors that force them to depend on paraffin and dangerous paraffin appliances for their household energy needs. The inadequate ways in which paraffin is produced, bought, and stored, and the unsafe paraffin appliances in which it is used, are largely responsible for the thousands of informal settlement fires, ingestions of paraffin by children, and inhalation of toxic pollutants by users (Swart, 2007).

Dehran Swart from PSASA argues that, "the nature of the paraffin problem is quite complex. There is not just one government department we should be working with. I think that it is a real challenge, because it is a housing issue, a health issue, a local government issue, a trade and industry issue and an education issue" (Swart, 2007). That having been said, it is imperative that each of the corresponding government departments take immediate action to begin addressing the thousands of paraffin-related incidents, injuries, and deaths that are occurring in South Africa each year largely due to unsafe paraffin appliances and inadequate packaging of paraffin.

In response to the need for government mandates on the safe packaging of paraffin, Elsabè Steyn, Director for standards and environment at the Department of Trade and Industry, implies that businesses and industries should self-regulate the packaging of paraffin and the use of child-resistant safety caps (CRCs):

> It's a case of economics and I am not sure that, if an accurate cost benefit analysis was carried out, mandatory CRCs would be viable. Besides the enormous cost to businesses to retool manufacturing processes—which inevitably they will try to recoup from consumers, the overwhelmingly largest percentage of whom are extremely poor—legislation needs policing, which would require further investment from government in terms of supervision (Haw, 2007:35).

The director for the Child Accident Prevention Foundation of South Africa, Nelmarie du Toit, argues, however, that "CRC technology is well advanced in this country, and there is no lack of competence or facilities in our packing industry…And certainly, if it is a case of economics, prevention is cheaper than cure" (Haw, 2007:33). With government spending an estimated R104 billion each year on health and disaster relief as a result of paraffin-related incidents, it is clearly in their economic interest to take the necessary measures to reduce these incidents (Kruger, 2005:1). Furthermore, with inadequate packaging of paraffin causing 40,000-

60,000 children to fall victim to poisoning from paraffin ingestion each year, the discussion of the economic viability of CRCs is unacceptable. It is an outrage to think that either government or industry can talk about cost benefit analysis when millions of human lives are at risk. In turn, it is argued that the Department of Trade and Industry should take direct action to begin developing and implementing policy and legislation on the safe packaging of all paraffin. This policy should mandate that paraffin be sold in prepackaged containers that are clearly labeled with product information and safety warnings and symbols, and are sealed with CRCs.

"A Markinor survey in 2001 reported that 46,517 fires had occurred throughout the country in the previous 12 months. The news of almost four thousand fires a month in South African residential areas should have drawn some sharp reaction – cries of "scandal", perhaps – and urgent calls to action from politicians and the media. But it didn't" (PSASA, 2003d). Dangerous and often explosive paraffin stoves and heaters are known causes of a significant percentage of these fires and yet government has taken little to no action to remove these stoves from the market and/or implement mandatory standards for all paraffin appliances in South Africa.

> Southern Africa (PASASA) confirmed, with 100 percent certainty, that all wick based stoves burst into flames on falling over. In other tests carried out by Test House, a company affiliated to the South African Bureau of Standards (SABS), it was found that the most commonly used stoves failed the SABS's most basic safety standards. Despite the ever-present threat to lives and property posed by these stoves," (PSASA, 2003c) "as the law now stands, the manufacturers are not compelled to change the specifications of these stoves to make them safe – even though SABS has drawn up safety standards in this regard (PSASA, 2003b).

In reaction to this lack of formal legislation and regulation of these appliances, Glenn Truran, General Manager of the Paraffin Safety Association states:

> This situation is simply unacceptable. If vehicle or aircraft manufacturers ignored scientifically determined basic safety standards there would be a national outcry, but

> despite the some 80 000 paraffin related fires in South Africa each year little is being done. It is why we're calling on government to urgently introduce mandatory standards for paraffin stoves (PSASA, 2007c:1).

The South African Bureau of Standards has already taken an important step in the right direction by developing policy mandating strict safety standards for paraffin stoves. Now, however, it is essential that the Department of Trade and Industry provide the legislation, resources, and manpower to ensure the implementation and enforcement of these standards. Furthermore, it is recommended that the Department of Trade and Industry collaborate with researchers, scientists, corporations, NGOs, and other entities in order to develop safer models of paraffin stoves to be put on the market as soon as possible. Additionally, once these models are marketed, some type of program or subsidy must be available where old, unsafe paraffin appliances can either be bought back or traded in for the newer, safer models thereby ensuring that all South Africans have relatively quick and easy access to these safer appliances.

There is substantial scientific evidence proving the causal relationships between the inhalation of pollutants produced during the combustion of paraffin and the development of respiratory diseases and other serious illnesses (Ezzati and Kammen, 2002:815). Knowing this and knowing that millions of South Africans depend on paraffin for their everyday household needs, the South African Department of Health needs to take immediate action to develop preventative measures to reduce exposure to indoor air pollution. Such actions would include working with the Department of Trade and Industry to develop mandatory standards for paraffin stoves, which would include lower pollutant emission levels and working with the Department of Housing to develop a type of flue or ventilation device that could be easily installed in households directly above the location where paraffin stoves and heaters are used. Such measures would significantly reduce the amount of indoor air pollution in households.

It is no coincidence that the people in South Africa most severely affected by these health crises are among the poorest of the poor. If household appliances, such as microwaves or electric stoves, used by middle to upper class citizens in this country were known to be dangerous and explosive and were causing tens of thousands of fires, injuries, and even deaths every year, they would be pulled off the market immediately. Paraffin and paraffin appliances, however, are most commonly used by low-income households. These users generally do not have the knowledge, time, or resources to stand up for their consumer or human rights and have little power to force anyone to address the terrible injustices they are suffering, largely at the hands of the government and industries that continue to fail to properly regulate these goods.

While the media has done a fairly good job of reporting on the innumerable paraffin-related incidents that occur in the country each year, they have failed appropriately to pressure government and industry. It is time that the media, the medical community, organizations, and community members speak out on behalf of the voiceless and demand that immediate action be taken to reduce the risks and harm associated with paraffin use. Until such action is taken, thousands of innocent South Africans will continue to suffer and even perish from unnecessary and tragic paraffin-related incidents.

Recommendations for Further Study

In order for the findings of this study to be further explored, additional research on case studies, scientific reports, and relevant media articles is necessary. This would provide useful information and research data which could help to develop broader theses and conclusions on issues related to paraffin.

Continued research and analysis on the impacts of educational programs would allow organizations such as PSASA to gain a better understanding of the relative success of such

programs and would ultimately allow them to verify whether or not their messages and programs are reaching their target audiences.

Further investigation into the creation of safer paraffin appliances and packaging and the policy and legislation regarding these issues would provide the basis for an interesting impact analysis study. If a safer appliance has been introduced on the market, for instance, or if government has developed legislation on mandatory standards for paraffin and paraffin appliances, it would be interesting to investigate what impacts, if any, these actions have had on the number of paraffin-related incidents and injuries.

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Appendices

APPENDIX 1: PARAFFIN SAFETY RULES

(*Source: Paraffin Safety Association of Southern Africa)*

KEEP PARAFFIN UP AND AWAY WHERE IT IS OUT OF SIGHT AND REACH OF YOUNG CHILDREN.

· Paraffin is dangerous. It can kill if not handled properly
· It is best to keep it locked away
· Store paraffin in its own special bottle. Avoid storing it in a cold drink bottle or milk container
· Make sure your paraffin bottle is carefully labeled so that people will know it has paraffin in it. Make your own label if you have to. Add words like "Danger" to it.
· Put the cap of the bottle on after usage.
· Use a funnel to pour paraffin. Avoid using a cup. Also put funnel away after usage.

IF A CHILD SWALLOWS PARAFFIN ACT QUICKLY

· Do not wait. Get the child to clinic or hospital immediately
· Give the child nothing to eat or drink
· Do not make the child vomit
· If paraffin is spilt on clothing, remove the clothing to avoid breathing in paraffin fumes
· If just a drop of paraffin gets into the lungs it causes serious damage to the lungs

GIVE NOTHING TO EAT OR DRINK IF A CHILD SWALLOWS PARAFFIN

· DO NOT give any medicine, traditional medicines, food, milk, or home remedies.
· Provide comfort and support
· Think of having an emergency plan available to get patient to clinic or hospital

KEEP THE AIR IN YOUR HOME CLEAN and SAFE

· Let fresh air into the room when you are using a paraffin appliance - fresh air clears the bad fumes
· Paraffin should be clear in colour, and uncontaminated with any other fuel like petrol, diesel, etc.
· It is a good investment to purchase the safest stoves, heaters and lamps as a way of preventing injury and not putting yourselves and others in danger. In this way you can combat air pollution and fires.

BIG FIRES START WITH A SMALL FLAME

· Turn appliances off when you leave home or go to sleep.
· Make sure you appliance is working properly. Do not use it if it is broken or smoking a lot. Make sure your appliance is serviced regularly. All appliances have a life. If your appliance is not working as it should and cannot be fixed, it is time to stop using it.
· Use only paraffin in a paraffin appliance; make sure the bottle you use to store paraffin has not been used for anything else, especially petrol.
· Replace wicks when they get old and cause smoke.
· If your appliance is leaking – do not use it – it could cost you your life!
· All fires and appliances must be supervised
· Place paraffin appliances away from things that can burn
· Put paraffin appliances on a steady and even surface where they cannot be knocked or pulled over.
· Keep a bucket of dry sand ready to put out paraffin fires.

IN THE EVENT OF A FIRE

· Stay calm do not panic
· Raise the alarm and get out
· Call the emergency services. Know where to find their numbers
· If building is on fire crawl low on hands and knees
· Should your clothes catch fire, stop, drop and roll over, to put out flames
· Keep a bucket of dry sand ready to put out paraffin fires.

ACT FAST TO COOL A BURN

· Stay calm do not panic
· Put the burnt area in cool water for 20 minutes
· Do not put anything on the burn – no butter, oil, lotions or medicines as it will make burn worse
· Get the person to a hospital or clinic immediately

APPENDIX 2: STANDARDS FOR WICK BASED STOVES

The SANS 1906:2006 wick stove standard covers:

- Prevention of leakage of fuel
- Self extinguishing if knocked over
- Ensuring the fuel in the fuel tank does not get too hot
- Prevention of harmful emissions to the atmosphere
- Stability and durability of the appliance
- Sustained power output over time
- Appliance cannot be filled when in use
- Will not burst into flames if knocked over
- Will not burn the user when the controls are touched
- Safety instructions and pictographs are included.

Source: PSASA Press Release: *SABS Gives "Name and Shame" Ultimatum to Paraffin Appliance Market,* 16 March, 2007.

APPENDIX 3: INTERVIEW QUESTIONS

Questions for Dehran Swart:

1. What is currently happening with government policy regarding mandatory standards for paraffin stoves?
2. When the illegal stoves began to be pulled off of the market, what stoves were left for consumers to choose from?
3. What was the result of the safer paraffin stove competition? What has been done with the winning stove?
4. Does PSASA have a research team or any other means of continuing to try and develop safer models of paraffin stoves?
5. What type of policy exists or is being formed on packaging standards?
6. What is the process of a policy being developed, passed, and implemented?
7. Has PSASA set any deadlines for government to develop policies?
8. Why are there such a limited number of clinics participating in the surveillance project?

9. What is the process of getting clinics to begin collecting data on energy related illnesses and injuries?
10. Why is it recommended that no food, drink, or medicines be given to a child who has swallowed paraffin?
11. What kind of educational curriculum has been developed for and/or implemented into the schools?
12. Why did you choose to develop curriculum for the specific grade levels that you did?

Questions for Felicity Mbambani:

1. Can you tell me about the work that you do with PSASA?
2. What are some of the programs and projects PSASA is working on in the Southern Region?
3. How are communities responding to PSASA's educational programs?
4. What are some of the struggles you deal with in trying to get these safety messages out to the communities?

Questions for Dr. Peter Martinez:

1. Can you tell me about the work you do with the Phoenix Burn Project?
2. What inspired you to found this organization?
3. Can you tell me the details of the various projects and programs of the Phoenix Burn Project, such as the soft toy project and the educational materials for parents?
4. Are your programs primarily for youth or for burn survivors of all ages?
5. What department/s of the government are you primarily working with?
6. What are the demographics of most of the children that your organization works with?
7. How do child burn survivors become involved with the Phoenix Burn Project?
8. Where are your programs and projects actually taking place?
9. How large is your organization? How many employees and/or volunteers do you have working for you?
10. Does your organization provide any type of psychological therapy for burn survivors?
11. Can you tell me about any new projects or programs that your organization is currently working on developing or implementing?
12. Where is that you see the Phoenix Burn Project being most successful right now?
13. Where do you see the most room for improvement and growth?

Questions for Johan Minnie:

1. Can you tell me about the work that you do with Disaster Management?
2. What forms of media are used for your public awareness and preparedness programs?
3. Are you able to determine the cause of most fires? How are they investigated?
4. How many fires are there annually in Cape Town and surrounding areas?
5. Is there a certain time of year that sees an increase in fires?
6. How large is the Cape Town Fire Department? What kind of resources do they have?
7. What are some of the biggest challenges with informal settlement fires?
8. What is Disaster Management doing to address paraffin-related incidents/injuries?
9. Where is it that you feel that Disaster Management being most successful?
10. Where is there the most room for improvement in Disaster Management?
11. What is needed for these improvements to be achieved?

12. Is there any additional information you'd like to share that you feel would be beneficial to my study?

Questions for Helen Macgregor:

1. What kind of government policy currently exists for informal settlement upgrades?
2. Which government departments are you working most closely with?
3. When developing plans for informal housing upgrades, in what ways are health issues taken into consideration?
4. In particular, how are paraffin-related incidents and health concerns impacting development strategies for informal settlements?
5. In relation to the issue of fire incidents in informal settlements, how are they being made more easily accessible to emergency services?

Questions for Zandile Mahlasela:

1. Do you use paraffin in your home?
2. What are your reasons for using paraffin?
3. What experiences have you had with paraffin?

Questions for Zanele Figlan, Nomakhaka Nini, Thandeka Seti, & Makhaya Ncukana:

(*Note: These questions were taken directly or in part from PSASA's Household Energy Survey)*

1. Do you use paraffin in your home?
2. How much do you typically spend on a liter of paraffin?
3. How much paraffin do you use per week?
4. Who usually buys the paraffin in your household?
5. Who usually uses and handles and paraffin in your household?
6. When you use paraffin for cooking, does the cooking usually take place inside or outside?
7. Do you keep doors and windows open while cooking inside the house during the summer? During the winter?
8. When you use paraffin for heating, do you keep the doors and windows open at all?
9. Where do you store your paraffin?
10. Is there any particular reason for the place you choose to store your paraffin?
11. How much paraffin do you usually keep stored in your household?
12. What type of container do you store your paraffin in?
13. Do you take your own container when buying paraffin?

14. What do you use to pour paraffin into your stove?

15. Do you currently have a wick based non-pressure stove or a pressurized stove?

16. How old is your stove?

17. How long does your stove usually operate well? (with no changes or problems)

18. How often do you usually replace your paraffin stove?

19. Do you usually repair your stove yourself or send it to someone for repairs?

20. Does your paraffin container have a child-resistant safety cap on it?

21. Would you be willing to pay more for your paraffin if it could be bought prepackaged in a well labeled container with safety messages and a child-resistant safety cap?

22. How much more do you think you would be willing to pay?

23. Have you or your family ever been affected by a paraffin-related incident? If so, what type of incident?

24. Why do you continue to use paraffin even when you have access to electricity?

25. What are your main reasons for choosing to use paraffin?

26. What do you think are some of the advantages of using paraffin?

27. What are some of the disadvantages of using paraffin?

28. Have you ever received any paraffin safety information?

29. What would you do if there was a paraffin stove fire in your home?

30. What would you do if your child swallowed paraffin?

31. In your opinion, how do you think paraffin fires can be best prevented?