

Increased Utilization of the Geothermal Lagoon Spa Water in Making Skin Care Products

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ABSTRACT

The latest entrant crowd puller to the unending list of attractions to the Olkaria Geothermal Project is the Olkaria Geothermal Spa. Sitting in the warm heat in the spa has a therapeutic effect on the skin and guarantees muscle relaxation especially for those suffering from arthritis. The Sulphur in the water, which is believed to have medicinal properties, is good for the skin and the central nervous system. It also helps relax tense muscles. The Spa benefits may go a long way to help many both in the country and across the globe. It is with this reason that we are proposing that KenGen partners with manufacturers of skin care products to enable production of the most unique line of skin care products from the brine. Several skin care products can be developed from the natural underground brine, which is rich in silica and other minerals. Such skin care products include lotions, creams, and facial cleansers and even lip care products. This will not only provide the company with a great alternative income but will also help market the Spa more for additional revenue generation. This paper describes usage of geothermal brine and silica in making several skin care products.

1.0 INTRODUCTION

Over the years Olkaria Geothermal Resource has been confined to energy generation until recently when KenGen established a Geothermal Health Spa and Demonstration Centre. This Centre showcases direct use applications such as hot/ warm water bathing for balneological effects, sauna, steam bathing, cooking, drying of fruits and vegetables, refrigeration, irrigation of crops and fish farming.

Olkaria Geothermal Spa is the first of its kind in Africa. It is located on the floor of the Great Rift Valley, about 120KM from Nairobi. The Geothermal Spa is right inside the Hells Gate National Park, the location of the Lion King film and adjacent to Mt. Longonot National Park. Occupying an area of about 4.5 Ha, the Centre provides the ultimate destination for revelers, away from the hustle and bustles of cities. Up the hill just close to the Centre, one can view wildlife such as giraffes, buffalos, zebras and many species of birds, striding.

The natural spa has four interconnected hot water lagoons. The Olkaria Geothermal Spa offers recreational and therapeutic swimming with its Blue Lagoons. There are three cascading lagoons or ponds. These ponds receive geothermal water or brine, collected through a system of lagged pipes from various tapping location on the brine flowing to well 708 within the Olkaria Geothermal field. The first is the receiving pond. It receives hot geothermal water with temperatures of approximately 90oC. This pond is not usable because of high temperatures. The Second pond fills up from the overflow of the first pond and has temperatures of about 60°C. It is also not usable.

The third and largest pond receives the overflow of the second pond and overpass from the first pond. Its temperatures range from lows of 30°C to highs of 40°C, and are good for relaxation as one enjoys the warmth of the water. The pool can accommodate up to 400 people. This pool has an island in the middle for aesthetic and lighting purposes at night as it has a lamppost.

An extension of this pond is the children's pool suitable for kids below 8 years. An extension of the third lagoon has a children pool hardly one foot deep where small children as young as two can enjoy the warm bath, under the care of life savers as their parents relax their bodies in the third or first lagoons

The spa attracts people from all over the world since as seen the warm brine has therapeutic benefit and gives one opportunity to relax, refresh and revitalize their minds, bodies and soul after a long stressful week. They can simply enjoy the clean, crisp, cool and reinvigorating air as they watch the day glide by or take a relax in the warm geothermal water, which is rich in minerals such as Sulphur and silica known to cure diseases such as psoriasis, Fibromyalgia, Arthritis among others. The blue lagoon skin treatment is natural and has no known side effects.

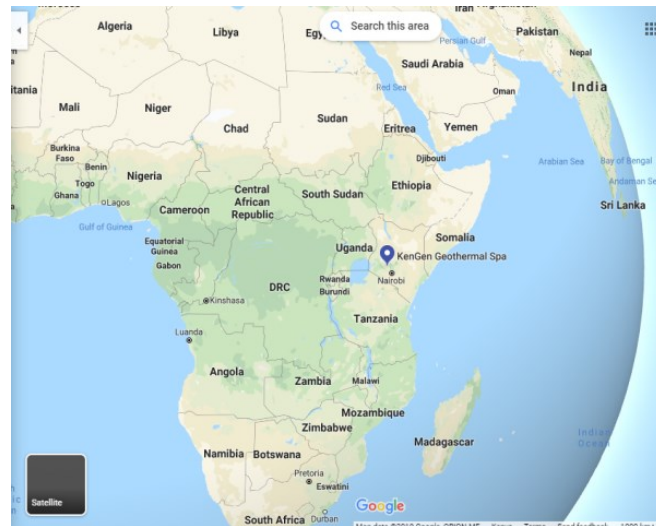


Fig.1 world map

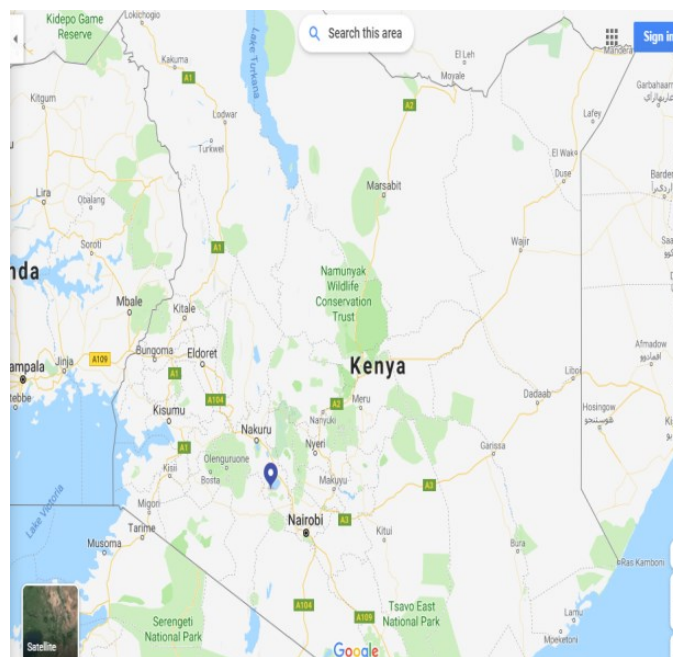


Fig 2. Kenyan map

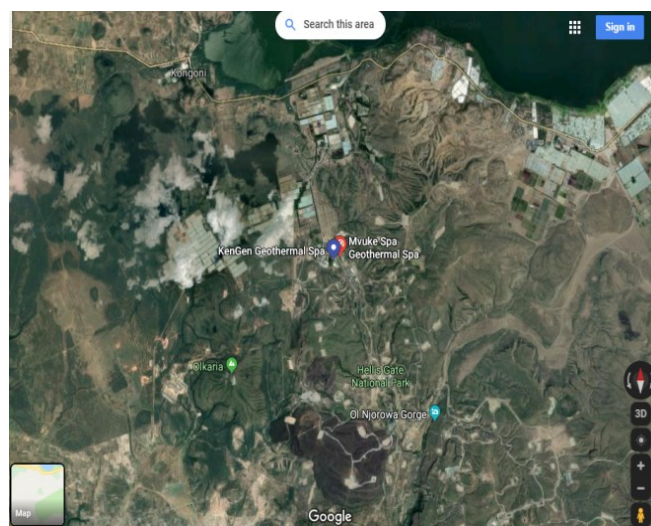


Fig 3. Map showing KenGen Mvuke and Geothermal spa

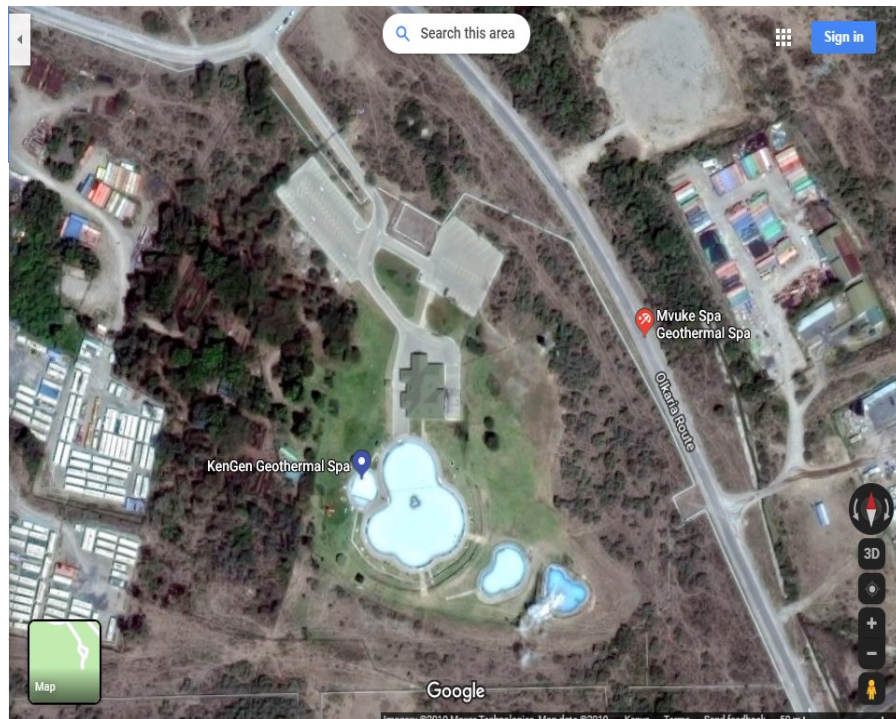


Fig 4. Geothermal spa location and conference area



Fig 5. Geothermal spa visitors on site



Fig 6. Geothermal spa pool coverage

2.0 OBJECTIVE

To research on ways we can optimize the spa by making skin care products either through self-manufacturing and selling or through contractual partnership with other firms.

Why Skin product?

The products are harvested by way of a zero waste process and adhere to the highest mandates of eco-friendly sustainability. Likewise, they are vegan and cruelty-free. These products especially the unique geothermal mud is renowned for its healing and invigorating properties. This mineral-enriched mud provides an excellent source of silica, alumina, magnesium, calcium, iron, titanium, Sulphur, phosphorous, sodium and potassium as well as trace elements such as copper, zinc, selenium, cobalt, manganese and molybdenum.

The range of products are also perfect for detoxifying and purifying tired skin, absorbing excess oils from pores and natural anti-bacterial agents work to assist in the prevention of acne and break outs. The geothermal spa will have a range of scrubs, masks, oils, lotions and salts for the face and the body.

We would like to carry out a skin care product research to enable us be able to come up with brine skin care products ranging from cleansers, toners, scrubs, masks, creams and oil manufactured from the brine contents. This will enable widespread of spa benefits even to those who can't reach Olkaria spa due to circumstances. The skin care product will also put into use the silica, Sulphur and lithium extracted one extraction process commences.

Meanwhile, KenGen can be selling the brine mineral to any manufacturing industry which will be willing to come up with the skin care products using brine as its raw material.



Fig 7 Iceland blue lagoon Silica mud mask



Fig 7 Iceland blue lagoon cleanser and toner



Fig 8 Iceland blue lagoon Silica scrub

Brine composition

As per the collected data from Olkaria's wells the brine composition upon separation is as follows:

Table 1. Brine composition

Item	OW-R3	OW-708	OW-703
Silica mg/kg	620	550	730
Boron mg/kg	3.0	3.2	2.5
Lithium mg/kg	1.32	1.4	1.7
Zinc mg/kg	<1	<1	<1

Total Brine flows estimated from the production tests (WESTJEC, 2014):

Table 2: brine flow in t/h

Area	Total brine flow, t/h
Olkaria I Connected	271.1
Olkaria II old wells Connected	686.0
Olkaria II new wells Connected	348.5
Olkaria I AU Connected	303.6
Olkaria IV Connected	1020.2
Total	2629.4

These have been estimated from the deliverability of individual production wells based on production tests. From the above table there is a relatively large amount of brine available which can be used in extraction of minerals for skin care product manufacturing.

3.0 RESEARCH METHODOLOGY

The research analyses the brine contents used in skin care production and market for the obtained research. This will show the quantity of mineral in the brine, quantity to be used in manufacturing skin care products, the amount required to come up with such an investment and the companies willing to partner with Kengen once all this data is obtained.

The research is both local and international (taking the Iceland blue lagoon skin care clinic as our international case study).

The data required to be researched will be as follows:

Table 3: Project development plan

	AUG	SEP	OCT	NOV	DEC	JAN(20)
Collect data on mineral quantity from our company's researches on extraction of silica, Sulphur and other minerals						
Visit blue lagoon Iceland to compare our mineral quality and Iceland's mineral quality and skin care clinic management						
Approach three manufacturing companies in Nairobi who manufacture skin care products.						
Presenting the data to the innovation committee directors to be presented to the board for further decisions.	FEB(2020)					

4.0 BUDGET

The research proposal's budget is estimated as follows:

Visiting local manufactures	150,000 Kes
Visit blue lagoon (Iceland)	500,000 Kes
Miscellaneous	100,000 Kes
Total	750,000 Kes

5.0 RECOMMENDATION AND CONCLUSION

The research will go a long way in enabling Kengen be able to make informative decision and also be at the upper hand with an elaborate research which can be shared with interested partner's at a fee. The research will also pave way for other investments opportunities such as mineral extraction since this act as one way to utilize the extracted minerals. This will increase the company's income and also allow many people be able to utilize brine's benefits at far areas.

The brine being reinjected will greatly reduce hence the company will save money used in drilling reinjection wells since there number will reduce.

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