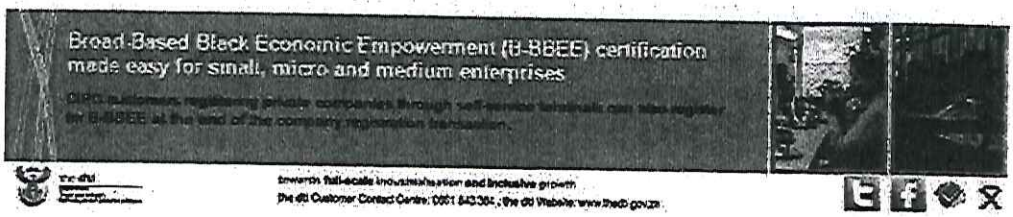
MSP BILL (B9-2017) I

Gavin Craythorne

From: Garth Strachan <GStrachan@thedti.gov.za>
Sent: 29 September 2015 09:48 AM
To: Gavin Craythorne
Cc: Garry Mouritzen; Peter Schroeder; 'MIASA-Vanessa Davidson'
Subject: Re: SOUTH AFRICA'S DIAMOND DIVING INDUSTRY: HIGH ROAD OR NO ROAD?



Dear Mr Craythorne

Thanks for the very interesting and informative e-mail.

With your agreement I will forward your e-mail to the Secretariat of the Mining Phakisa to evaluate whether or not we can include your proposals as a work-stream in the Phakisa which will be held shortly.

In any event I believe your proposals warrant an engagement with the dti (Both the Chief Directorates Primary Minerals Beneficiation and Upstream Capital Goods) to explore ways in which this could be taken forward.

I will revert as soon as my heavy schedule allows.

Thanks again and kind regards
Garth

Garth Strachan
Deputy Director General
Industrial Development Division
Department of Trade and Industry.
012 394 1166

>>> Gavin Craythorne <gavinjohn@outlook.com> 9/28/2015 2:26 PM >>>

Dear Mr Strachan,

By way of introduction, my name is Gavin Craythorne and I am writing to you in follow up to Mrs Vanessa Davidson's email to you last week on my behalf.

In appreciation of your valuable time and heavy work load I will try to be as concise and informative as possible. I think that a bullet point format will also be best in the circumstances.

1. My Background.

a. I trained as a diver in the SAN and after four years of service left the Navy in 1984 to begin a career in diamond diving.

b. I have been involved in this industry full time for the past three decades and know all of its unique dynamics intimately.

c. This involvement has taken the form of two distinct but complementary forms of expertise, that of actual underwater mining and that of engineering the tools for the job. Mining is conducted in Marine Alluvial CC and engineering in Rapid Mining CC.

d. Rapid Mining has successfully completed numerous projects on behalf of clients ranging in size from local small scale miners to public listed companies as well as the South African and Angolan governments. Details of these projects are available on my company's website www.rapidmining.com

e. The latest project was for a new turnkey 50 foot mining vessel that was successfully completed at the end of 2014 on behalf of client Remote Drilling Services (Pty) Ltd. (http://www.msgroup.net/page/remote-drilling-services/) The value of the project was R8.5 million.

f. Marine Alluvial is a contract miner with experience on multiple sea concessions and currently operates a state of the art 50 foot mining vessel out of Alexander Bay under contract to Alexkor. When Alexkor outsourced the mining of its marine concessions in 1999 I relocated from Lutzville to Alexander Bay where I have lived since.

g. While it has been my good fortune and privilege to become one of the very, very few successful marine diamond contractors in the industry I have, in the words of Susan Sontag, been obliged to pay certain kinds of attention. I was therefore a founding member of the Equitable Access Campaign, the organisation that was mobilised to bring the MPRDA and the BEE MINING CHARTER to the west coast diamond mining community and to campaign for the implementation thereof in the industry. In the course of EAC business I have given oral and written submissions to the Portfolio Committee under the chair of the Hon. Fred Gono.

2. The Industry's Background.

a. For the past four decades since it began, the diamond diving industry has generally confined its area of operations to the first of a series of wave-cut terraces that run parallel to the coast like serpentine steps leading deeper into the ocean. This geological structure is mirrored above sea level with the steps leading higher in land. They are the result of changes in sea level over many millions of years and reflect the elevations at which the process halted for long periods of time.

b. The diamond diving industry's confinement to mining only the first of the marine terraces (the current surf-zone) has been due to the general absence of sand overburden (due to the wave energy) as well as freedom from decompression constraints and risks. When it was pristine, this terrace was well mineralised and had an abundance of easy diamonds but over time the easy diamonds ramped down while the difficult diamonds ramped up, passing each other by sometime shortly after Alexkor began outsourcing to contractors.

c. At the start of the new millennium when the difficult diamonds began to increasingly characterise the health of the first terrace's diamond deposit it became apparent that a Darwinian flush had begun with significant numbers of divers leaving. The rate of flush increased steadily with time until the boom of

the offshore oil & gas industry was well established giving rise to strong demand for divers after which the diamond industry was gutted in about three years.

d. Recognising the existential threats posed collectively by resource depletion and climate change, in 2005 I began a process of research and development focused upon the introduction of new and innovative technologies as a means of securing a sustainable future for Marine Alluvial. As part of this process I purpose-built a new mining vessel in collaboration with Anton Tallie of Tallie Marine Ship Builders in St. Helena Bay. The primary design objective was to improve upon the industry's primitive home-made mass flow excavation systems which although proving to be quite effective, had not evolved and remained primitive, thereby limiting their application to shallow water and 3m of sand overburden.

e. Mass flow excavation is the method by which sand overburden lying on top of diamond gravel deposits is displaced by a current of low pressure, high volume water generated by the mining vessel's propeller and directed toward the sea bed using a large fabricated duct having a 90 degree bend.

f. The concept is a migrant technology from the wreck diving industry that has also been adopted by the oil and gas industry. Recognising the enormous potential it offered, this industry has rapidly developed advanced systems with very high power ratings giving rise to a specialised field that supports a number of oil & gas engineering companies who design and build them. Examples are:

i. www.seatools.com

ii. www.james-fisher.com

iii. www.deepcgroup.com

iv. www.scan-tech.com

g. The close coupling of Marine Alluvial and Rapid Mining provided an effective feed-back loop to design, build, test and improve the systems giving rise to a situation where today Marine Alluvial is the most successful boat-based diamond diving operator in the industry and Rapid Mining is the leader for engineering solutions.

The technical and operational progress made by Rapid Mining and Marine Alluvial respectively over the past decade has provided me with a first-hand opportunity to experience the design, fabrication and application processes thereby enabling me to gain three insights which I believe have game-changing implications for the diver dependent sector of the diamond mining industry. These three insights are as follows.

i. Mass flow excavation is the most economical, effective and energy-efficient means of displacing fine grained overburden covering diamond bearing gravel.

ii. The ability to excavate through sand deeper than 3m enables the miner to extend the utility of the mass flow excavator to become a non-contact mining tool for the break-out of the gravel ore from the boulder bed into which it has been firmly consolidated over time. This has introduced mechanised mining to the inshore diamond industry (accidently as we were not expecting it) for the first time and in a manner that is already highly effective yet also demonstrates great potential for the future.

In quite a marvellous display of irony, the sea not only provided a guardian to preserve the best part of the marine diamond resource for later generations, it turns out that the same guardian (sand overburden) is now providing our industry with the means to mechanise by utilising the deep opencast pit as a geo-

structure into which the full power of the mass flow excavator can be directed to disaggregate the ore at the bottom without the risk of diamonds being propelled out of reach. Adding a little more irony is the fact that this process is not new (an understatement to say the least), having been used extensively by the ancient Romans in a mining method called hushing. Pliny the Elder, a Roman historian wrote a description of the technique, details of which are available at https://en.wikipedia.org/wiki/Hushing.

iii. Rapid Mining's new mass flow mining method is still in the very early stages of a development process that has taken place thus far using only the most basic of design and engineering capabilities. With access to advanced computer aided engineering and manufacture, MFM systems can be optimally designed and scaled substantially to provide the tool capable of unlocking the value of a diamond resource that is known to be world class but believed to be untouchable.

3. The Project's Background.

a. In January this year I responded to an invitation by MIASA to attend the MARINE INDUSTRY INNOVATION FUND INFORMATION SHARING SESSION.

b. This led to my being introduced to Mrs Davidson who has been very helpful and informative with regards to the various government incentive programs. I learned about Operation Phakisa and so began a process of deep reflection on the poor state of the marine diamond industry, the collapse of which over the past decade I have been a witness to, and as to how the power of Phakisa could be harnessed to reverse the situation and propel it into a new era of growth and prosperity.

c. Shortly thereafter, I had a very successful sea trip resulting in the production of diamonds with a value in excess of R10 million. This was not the first to have occurred due to the adoption, development and practice of the MFM method and also, I believe, validates the proposition that technically advanced mining methods can and are being developed for our industry to overcome the challenge of deep overburden and thereby enable the successful mining of the outer terraces as well as the delta of the Orange River beneath which there exists a very high probability of repeated recoveries of single diamonds over 100 carats.

d. As a keen observer and active participant in the techno-industrial revolution sweeping across the globe I then embarked upon a worldwide tour in order to search for emerging technologies that could be introduced into the MFM system in order to optimise the design. The tour included the USA, Norway, Denmark, Germany and the UK.

e. In the course of my travels I visited a number of highly specialised companies and research institutions which provided me with a deep understanding of which technologies were relevant and how they can be integrated with the MFM system or used in the design and manufacture thereof. Further investigations revealed that many of these technologies and domains of expertise are available locally, for instance that of computational fluid dynamics, for which there is a world class research team based at the University of Cape Town under the leadership of Professor Arnaud Malan.

f. My view, based upon three decades of experience as a marine miner and mining systems designer/integrator is that the diamond diving industry in the Northern Cape, far from reaching the final stages of its existence as many believe, is only reaching the end of the first phase, a phase that has lasted for four decades but on a mining method that has now become redundant due to technical limitations.

g. This view is supported by the proven existence, beneath sand overburden, of a pristine world class diamond placer deposit that runs the entire length of the Northern Cape coast, along which there are also strategic natural harbours located and for which a new technology-enabled mechanised mining method

has emerged. Companies like De Beers and IMDSA have surveyed it quite extensively using sub-bottom profiling acoustics but so far have only been able to look at it, not reach it. In due course I can explain why this is so but that would have to form part of an in-depth technical discussion.

h. Furthermore, as a community activist with a deep understanding of the important contribution diamond diving has made to the Diamond Coast's socio-economic survival and in light of the conclusions stated above, I am confident that by carefully planning and executing a large scale development strategy for the entire Diamond Coast, from Hondeklipbaai to Alexander Bay, the aims and objectives of the NDP can be achieved in the most profound way.

i. We have a "perfect storm" of opportunity gathering in the form of a rare alignment in the economic fundamentals for the diamond industry just as we are in the process of finally developing the advanced mining capability needed to unlock the value of our formidable diamond endowment.

j. In approximately three years' time these fundamentals are set to kick in with a very high probability of a ten to fifteen year bull market for diamonds developing. This provides enough time to plan and execute an integrated industrial development programme for the build out of a technically advanced mining capability with the supporting infrastructure in order to maximise the benefits of our natural resource advantage right from the start of the super cycle. (We can even ask Peter Bruce to give his expert advice on the policy aspects).

k. By preparing well for this generational opportunity we can provide the primary source of value and industrial core for catalysing a number of additional industries that have inherent synergies to exploit. The economy of scale arising out of this integrated approach provides the basis for an infrastructure development plan, the most important component being a tar road linking the N7 at Garies to Hondeklipbaai and continuing up the coast to Port Nolloth thereby linking the three harbour towns of the Northern Cape by tar road. The remote Diamond Coast can then be transformed into a Diamond Route for the community to share its unique diamond diving heritage with the rest of the world. Not just those who are fortunate enough to be able to afford 4x4 vehicles.

l. The key to achieving the economic critical mass the Diamond Coast needs in order to embark upon a developmental path that will not stall is to aim and plan for the highest level of collaboration with other industries and professions that fit naturally into a diamond based economy in order to build in as much economic logic possible. This creates the capacity for exploiting the entire diamond value chain locally thereby maximising the resource benefit for all who live on the Diamond Coast.

m. By embarking upon a **thematic economic development** effort for the Diamond Coast, as opposed to ad hoc "islands" of business activity, a common vision is provided which has a place for all to help build and share in the fruits of its growth. The most compelling initiatives are the following:

i. Heritage tourism focused on the diamond diving industry with a local cutting, polishing and jewellery industry equipped with the latest digital manufacturing technologies, a modern museum with multi-media content, boat trips, dive trips to observe diamond divers at work underwater and waterfront restaurants to watch diamond boats off-loading gravel in the harbours.

Gaansbaai, with its shark cage diving industry, is a textbook example of how a unique marine tourist experience can fuel sustainable economic growth for a community. Did anyone believe fifteen years ago that Hollywood movie stars would be visiting South Africa to observe great white sharks in their natural habitat? However the uniqueness, size and quality of the marine diamond placer adjacent to our Diamond

Coast community offers a value proposition orders of magnitude greater with many more linkages supportive of large scale industrialisation and enterprise development.

ii. A Diamond Centre to provide a location for all diamond based commerce in a secure and comfortable environment providing for:

1. Sorting and valuing.

2. Locally based STD.

3. Rough tenders.

4. Cutting and polishing.

5. Laboratory services.

6. Polished trading.

7. Jewellery design and manufacture.

8. Retail jewellery boutiques.

9. Banking.

10. Ram/DHL courier services.

11. Specialised security.

12. Kosher and Halāl dining. (Poeitjie kos, tjops and boerewors too)

13. ICT and business bureau.

14. Information bureau promoting a professionally engineered brand for marine diamonds and direct foreign investment into the marine diamond industry.

15. A training campus providing local and inbound students with access to digital manufacturing skills, grading, design and other associated training.

iii. Hospitality industry catering for the business traveller and tourist.

iv. Transport industry providing local and international travellers with airline and car rental services at an upgraded/recommissioned Alex airport.

v. Helicopter trips overflying the mining operations.

vi. Aviation support services eg. Fuel supply, air traffic control, aircraft maintenance, hangars etc.

vii. Industrial development and sideways beneficiation.

1. Advanced technology steel boat yard for production of high powered, highly specialised self-contained floating mining operations to optimally exploit the most challenging diamond deposit in the

world in a manner that is aligned with the objects of the Mining Charter and in full compliance with the Mine Health & Safety Act.

2. Advanced manufacturing facility for production of specialised waterborne mining equipment capable of mining in water depths up to 30m and excavating through sediment overburden up to up to 15m thick.

3. Computer aided engineering tools including PLM, FEA AND CFD.

4. Research and testing facility for the generation of specialised knowledge in support of designing and engineering optimal mining solutions.

5. Dry-docking and ship repair/maintenance.

6. Hydrographic survey.

viii. Trans-border provision of contract mining services to Namdeb.

1. The on-land mining licence held by Namdeb that is located adjacent to the mouth of the Orange River and which has been mined for almost a century, extends into the Atlantic ocean to a depth of 30m. It has been exhausted on the land and what remains is the section in the sea which is being mined using sea walls as far as possible but the limitations of this method have almost been reached.

Namdeb, despite many millions in R&D, do not have a mining solution with the capability to mine any deeper into the sea and De Beers Marine working offshore are unable to work any shallower than approximately 90m resulting in the lack of a capability to mine a corridor as wide as about 10km. Their dilemma is due to the 220T crawler's inability to mine through deep sand overburden while the large vessel required to support it is unable to navigate the shallow depth. This corridor is arguably the world's richest diamond deposit in terms of value per tonne.

This will require diplomatic interventions, however the ground work has already been laid by initiatives such as the African Union's Agenda 2063 and the tri-nation Benguela Current Large Marine Ecosystem between South Africa, Namibia and Angola. The fortuitous position of our industry shortly becoming possibly the only one to enjoy dual Phakisa status is also encouraging.

n. The scale and scope of this proposed development in terms of the resources needed to build it are significant but they are appropriate for the value and opportunities it will unlock from the sea as the diamond resource along the Northern Cape coast has adequate capacity to sustain a world class mining industry for the rest of the century. This may sound outrageous but the data are available to back this claim. To quote Alexkor's website "Over the life of the mine (ie the mining of the land terraces) approximately 10,000,000 cts of gemstone quality diamonds have been recovered". This figure excludes De Beers' Namakwaland Mines' production.

o. The spatial attributes of the diamond diving industry in terms of the marine diamond placer distribution and the convenient location of the three natural harbours strategically spaced along its extent provide compelling economic logic to build a tar road from Garies to Hondeklipbaai, continuing through Koingnaas and Kleinzee to Link up with Port Nolloth and thereby provide the main artery of a Diamond Coast Tourism Route running from Hondeklipbaai, via Port Nolloth to Alexander Bay.

p. The harbours will need to be redeveloped and in the case of Alexander Bay Harbour, deepened to accommodate a recapitalised mining fleet of mechanised mining vessels.

There is a lot more detail to go into but that would be more appropriately attended to in the event of an escalation of our interaction which I sincerely hope will be the case and for which I will gratefully make the journey to Pretoria.

Thank you for giving me this opportunity to share with you the future of the Marine Diamond Mining Industry.

Yours faithfully,

Gavin Craythorne.

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www.rapidmining.com