To visit our website,**www.flow.co.za**, click here

X-LOW-FLUOR_1_070727_25.DOC
E:\DOCUMENTS\WRITE_UPS\
DATE: 2002-11-04
UPDATE: 2007-07-27

THE MYTH ABOUT LOW FLUORESCENT DIAMONDS

Geologists, metallurgists and diamond miners have been talking about “LOW FLUORESCENT DIAMONDS” (LFD) and even “NON FLUORESCENT DIAMONDS” for as long as x-ray diamond sorting technology exists!

Rumors and stories surrounding these LFD’S have certainly made many suspicious and shy away from using x-ray based diamond recovery technology.
It is however interesting to note that all the big diamond mining houses, all around the world, use x-ray sorters! This fact alone shows that LFD’S are not very common and of little practical concern.

The latest trend seems to be that various x-ray diamond recovery machine manufacturets claim that their machines are superior to those of their competitors when it comes to recovering these mysterious LOW-FLUORESCENT-DIAMONDS!

We at FLOW SORT have become used to our competitors spreading all kinds of rumours as to why their product is “better” than ours! Unfortunately, for them, they are getting further and further behind in backing-up their accusations with sales of their superior products! (There is some truth in the good old saying: ‘The proof of the pudding is in the eating’!)

First we had to deal with claims that our mechanical ejector is not going to work!

We proved them wrong! Our mechanical ejector has become one of the top selling features of our product! And indeed in wet diamond sorting our mechanical ejectors have proven to be superior to the traditional pneumatic “mud-sprays”.

Then claims were made that diamond recovery from wet concentrates was less efficient than from dry concentrates!

Again we proved our competitors wrong! In several diamond-recovery plants are tailings of our x-ray sorters are passed over a grease table. The fact that there are no diamonds found on these back-up grease tables is proof that our sorter has not ‘missed’ any diamonds whatever their x-ray fluorescence properties may have been! And somehow I don’t believe that any of our competitors ‘dry’ x-ray diamond recovery machines can pick-up more then 100% !

And now I hear that some of our competitors claim that their sorters do recover LFD’S that FLOW SORT x-ray diamond recovery machines can not recover! Now let’s look at these (foul) claims in a bit more professional way:

The story of Low Fluorescent Diamonds (LFD'S) is a very sketchy and obscure one! There is no published standard or specification as to what puts a diamond into the LFD category. Suppliers and users of x-ray diamond recovery machines all have got their own ideas and interpretations. And specifically suppliers of x-ray sorters tell their prospective customers all kinds of stories. They try to sell their products on the grounds that their machines can recover LFD's and their competitors sorters cannot.

Flow Sort has recently developed a Fluorescent Particle Analyzer (FPA). This tool is designed to measure the fluorescent properties of individual particles (such as diamonds) when they are exposed to x-ray radiation. And most important, these measurements give a direct indication of how to set-up a FLOW SORT x-ray diamond recovery machine to recover (or not to recover) specific fluorescent particles!

I have used one of our FPA's to establish some facts about LFD: More specifically to measure the total luminescence of such LFD's and then put these luminescence values into perspective so that they can be compared with various fluorescent tracers currently used by the industry. Here I have to mention that fluorescent tracers, used for the purpose of testing the efficiency of x-ray diamond recovery machines, are just as mysterious objects as LFD'S themselves. Most of these tracers carry tags of 'mV' (milli Volts, a unit used for measuring an electric potential) but no one seems to be quite sure what 'mV' in the context of light emission measurement actually means. It is accepted that a tracer with 4000mV fluoresces twice as intensely as a tracer with 2000mV and even that holds only true if both tracers are of identical physical dimensions. It is interesting to note that you get say '2000mV' tracers in different sizes 10mm cubes, 3mm cubes etc. yet the small as well as the larger one are both labeled '2000mV'! This indicates that a tracers 'mV' rating does not refer to its total luminescence (Lumen) but rather luminescence-density (Lux) related unit. How a 2000mV or 4000mV tracer relates to the emission of light from a diamond excited by x-rays probably only the tracer manufacturer knows!

The exact procedure that I had to follow in order to un-ruffle a mess of sketchy, incomplete and often misleading information does not fit into the frame work of this brief resume. I am however, only too happy to discuss it in detail with anyone interested.

In brief this is what I did:

1. I measured the total fluorescence (in micro-lumen, µlm) of several hundred diamonds sized between 1.0mm and 1.5mm which all were recovered by a FLOW SORT x-ray diamond recovery machine model XR 2/19 DW.

2. Take note that all these diamonds had been successfully recovered by one of our own x-ray based diamond recovery machines (XR2/19DW). I therefore had to assume that none of these diamonds were of the 'LFD' type or that our sorter had recovered 'LFD'S'.

3. The average fluorescence level of these -1.5mm sized diamonds was found to be 1.5µlm (micro lumen), whilst at the low end of the range I found diamonds with fluorescence levels below 0.4µlm (the lowest one with 0.05µlm).

4. I then established the fluorescence levels produced by x-ray fluorescence that are commonly referred to as "low fluorescence level tracers". These (violet) tracers (3mm cubes) are rated '250mV'.

5. Violet ‘250mV’ tracers (3x3x3) produced typical luminescence levels of 0.4µlm

6. I remember that an expert once told me that diamonds that fluoresce less than these ‘250mV’ tracers are regarded as low fluorescent (LFD’S) and that such diamonds require “highly sensitive x-ray technology” to recover them!

7. It follows that as FLOW SORT’S standard sorter model XR2/19DW had recovered such diamonds (LFD’S), our sorters must be considered to employ “highly sensitive x-ray technology”.

8. I now was curious to find the limit of x-ray based diamond recovery machines. I measured fluorescence levels of 10 different types of fluorescent tracers, all with known ‘mV’ values. This way I established a correlation between ‘mV’ values and absolute light emission in µlm.

9. I found ‘Olive tracers’ (3mm cube) that weigh-in at ‘160mV’, they produce luminescence of as little as 0.26µlm!

10. Again quoting the expert: “Diamonds with fluorescence values below ‘160mV’ (0.26µlm) are regarded as not recoverable by x-ray technology”. Well, I am proud to say that our standard sorter model has recovered 2 (two) diamonds with fluorescence levels of less then 0.26µlm!

CONCLUSION: Yes, ‘Low Fluorescent Diamonds (LFD)’ do exist, (but then no one has disputed that fact), the question was ‘how do you describe a LFD! The answer: ‘**an LFD is a diamond that generates less than 0.5µlm of total luminescence when exposed to a x-ray radiation flux of 2200 Sv*10^{-3} /min (milli Sievert per minute) originating from an x-ray tube operated @ 35kV, 5mA with W-target and 1.0mm Be window’.**
And most importantly; Yes! We did prove that FLOW SORT x-ray diamond recovery machines **do** recover LFD’S! If anyone says otherwise its just cheap sales talk!

Peter Wolf