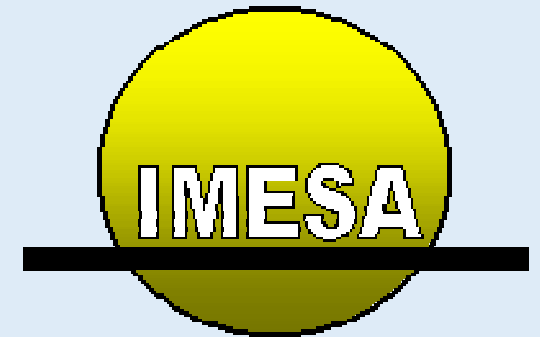


Presentation to IMESA Karoo and Southern Cape Branch

Presented by Enrico Anelli Pr. Cert Eng

On the 28th August 2015 at The Dunes, Arniston in the Southern
Cape



Brief Introduction to Second Opinion Consulting.

- Second Opinion Consulting, offers Microbial Inoculation Interventions to the Waste Water Treatment Industry in the form of easily applied pourable Products.
- Our Products are locally blended from tried and tested ingredients sourced from Biodyne World Inc. Biodyne World have more than 30 year successful experience in the Field of Bioremediations, Bio-Augmentations and Bio-Stimulation. My next 2 slides will briefly explain these 3 concepts to you.
- Enrico Anelli is the founding member and owner of Second Opinion Consulting. He is a qualified Electrical Engineer with a Government Certificate of Competency and 25 years experience in the manufacturing industry. We are a Level 4 BBBEE contributor.
- I have been involved in Waste Water processes for most of these years and am fully conversant with most waste water treatment processes.
- Our Products and Service is underpinned by our core values of honesty, integrity, adherence to quality and experience. We add value to our clients through our solutions and results driven approach.

AGENDA

- | | | |
|-------|-------------------|--|
| i. | What ... | What is the meaning of Bio-Augmentations |
| ii. | Why.... | Why do we need to add Microbes |
| iii. | What..... | What are the inoculums made from? |
| iv. | What..... | What benefit do you get from this? |
| v. | What..... | What will you see and smell at your plant |
| vi. | Who..... | Who adds the products? |
| vii. | Where..... | Where is it added? What parts of a plant can be treated. |
| viii. | How..... | How is it done? |
| ix. | History & Proof.. | Before and After examples will be shown. |
| x. | Q & A.... | There will be 5 minutes for questions. |

The intended outcome of my presentation is to stimulate your curiosity into making use of the Bioremediation and Bio-Augmentation Products & Techniques available from us at Second Opinion Consulting and Biodyne South Africa.

What is Bioremediation and Bio-Stimulation.

- Bioremediation is a process where you add viable non pathogenic microbes to Soil that has been contaminated by Hydrocarbons. These hydrocarbons are then cleverly digested by these microbes into Carbon, Hydrogen, Water and some natural inert gases. It is also a word most often used to describe the process of Bio Augmentations.
- On the other hand Bio-Stimulation is a process where you add viable non pathogenic microbes to soil or other plant carriers like hydroponics to assist in the freeing up or release of locked in N and P back into the soil. This reduces fertiliser use and results in larger crop yields and products getting to the market earlier when prices are higher thus earning the farmer more income.
- We have all of these viable microbial products available in South Africa and these processes of Bioremediation and Bio-Stimulation are our biggest sellers internationally.

Here is an example of Bio-Stimulated Plants using our 401 strain of Inoculums.



Some benefits in this 1:1 vermiculite:perlite media system include; more leafy material, larger root crops and increased fruit production.

What is the meaning of Bio-Augmentations with respect to their use in Waste Water Treatment Works.

- Bio-Augmentation is the process where Extremely Viable and Beneficial Bacteria or Microbes along with carefully selected Yeasts and Fungal Strains are added to a body of Waste Water to augment the existing microbial digestive populations. This increases the efficiency and effectiveness of the liquor mix in the plant. These strains are all derived naturally from the earth. They are amongst us and we harvest them for this purpose. The bugs/microbes most found in Waste Water Treatment Plants come from the human gut. Proper prepared Bio-Augmentations like our varieties must be able to perform both aerobically and anaerobically
- These Microbes don't have mouths but feed through their cell walls by secreting enzymes into the water so as to make the food more simpler to absorb. These secretions are the key to breaking down the organics. The microbes process this Organic and Inorganic Matter with these secretions and do so very efficiently.
- The key thing to remember is that it is always better to have the **enzyme factories** (the microbes) than just the enzyme itself. In the former, when the enzymes get depleted for whatever reason, more will be on the way. In the latter, when the enzymes are gone, they're gone. The ENVIRONOC Microbial Range of Products are the World's Best Enzyme Factories.
- We only supply products that are correctly prepared and that offer the best value for money.
- We are involved in many WWTW plants around South Africa for the last 3 years.

Here is a list of what substances our Microbes Digest. We removed the names of our Strains but we will share this info when we meet to discuss any challenges or requirements you may have. We will assist all and co-operate in confidence.

Environoc 301			
NAME (# in blend)	ORIGIN	TARGET(S)	COMMENTS
<i>Alcaligenes</i>	soil	H ₂ S	Commercial identification, non-pathogenic for animals & plants
<i>Enterobacter</i>	soil	Starch, lipid	Classical & 16S rRNA gene sequence Identification, non-pathogenic for animals & plants
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<i>Enterobacter</i>	soil	Starch, lipid	Classical & 16S rRNA gene sequence Identification, non-pathogenic for animals & plants
<i>Corynebacterium</i>	soil	Lipid	Commercial identification, non-pathogenic for animals & plants
<i>Corynebacterium</i>	soil	Cellulose	Commercial identification, non-pathogenic for animals & plants
<i>Corynebacterium</i>	soil	Cellulose	Commercial identification, non-pathogenic for animals & plants
<i>Enterobacter</i>	WW	Simple sugars	Commercial identification, non-pathogenic for animals & plants
<i>Enterobacter</i>	soil	protein	Classical and API identification, non-pathogenic for animals & plants
<i>Enterobacter</i>	soil	Starch, protein, lipid	Classical & 16S rRNA gene sequence Identification, non-pathogenic for animals & plants
<i>Enterobacter</i>	mud	H ₂ S	Commercial identification, non-pathogenic for animals & plants
<i>Enterobacter</i>	WW	Vitamin source	Commercial identification, non-pathogenic for animals & plants
<i>Enterobacter</i>	soil	Protein, lipid	Classical & 16S rRNA gene sequence Identification, non-pathogenic for animals & plants
<i>Enterobacter</i>	soil	Cellulose, chitin	Commercial identification, non-pathogenic for animals & plants
<i>Enterobacter</i>	soil	H ₂ S	Commercial identification, non-pathogenic for animals & plants
<i>Enterobacter</i>	WW	Lipid	Commercial identification, non-pathogenic for animals & plants

in blend = individual strains with the same genus and species name may have one or more biochemical and/or metabolic differences in their biodegradation abilities

Starch = carbohydrate polymer common in domestic and some industrial wastewater Cellulose = difficult to degrade structural carbohydrate polymers common in domestic and some industrial wastewater

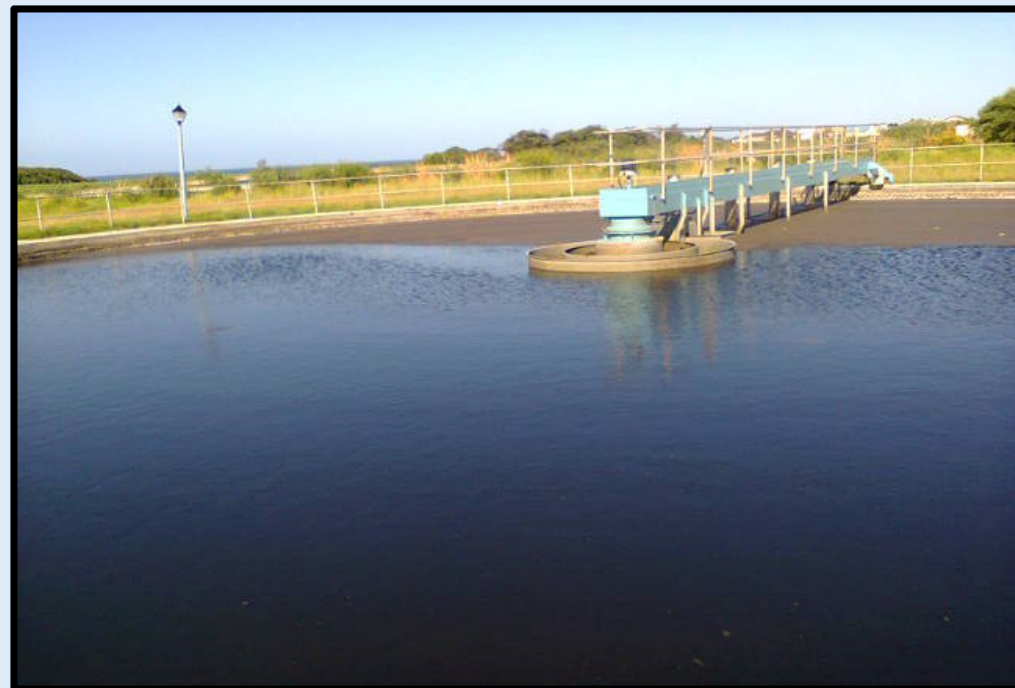
Protein = amino acid polymer common in domestic and some industrial wastewater Lipid = fatty acid polymer common in domestic and some industrial wastewater

chitin = difficult to degrade structural carbohydrate polymer common in domestic and some industrial wastewater H₂S = hydrogen sulfide degradation by biological oxidation

Here is a First Example I wish to show of a major problem faced by a Customer with a Blocked, Bunged up Clarifier.



Day 1 photo of where we treated with 20L of Environoc 301.



Result after Day 5 after where we had treated with 20L of Environoc 301.

Second Example of a Challenge faced by Customer.
Here we have a Completely sludged up Maturation Pond



Completely sludged up Maturation Pond

Completely cleared in 2 months
and remained so for > 6 months



What we are faced with and are entrusted to improve and solve. (This is a 3rd Example). We have many others.



Initial Challenge for customer



Customer's outcome after 49 days

Why do we need to add to / or Augment to the existing Microbe Populations?

- WWTW Plants are overloaded because in many instances the infrastructure and human settlement around them has grown resulting in the plant needing to be able to operate above its design capabilities. Once this occurs the incapacity starts to rise as the systems become clogged.
- This is evident in the fouling up occurring in the downstream maturation ponds and the effect that this fouling has on resident polishing or buffering time. Effluent Water leaves the plant sooner because it travels faster through the maturation pond's buffer zone because there is less place for it to dwell.
- Plants are getting old and there are more equipment failures. Aerator and Belt Press Breakdowns.
- Theft of Copper and Metals and infrastructure.
- Load shedding resulting in plant sludge settling and suspended clarifier carry-over to the down stream system.
- Unscrupulous Dumping of Waste by users which kills off or harms the bugs needed to reduce BOD.
- Discharge by users of high COD producing waste.
- Overloading of plant caused by misdirected Storm water where roof gutters are illegally tied into the sewerage system by dropping the gutter downpipe waste line into the sewer gully. This causes terrible dilution and havoc at the WWTW.
- This all being said results in a DIMINISHING EFFECT on the Viable Populations in the plant. One option is to increase the capacity of the plant at great expense. The other is to ADD Viable microbes to your system.

What do these Microbes do for your plant?

- Reduces the BOD, COD, sludge, grease and hydrogen sulfide in wastewater treatment and collection systems. This is done by the microbial strains in the Environoc 301 mix.
- Increased and Improved removal of BOD, TSS, grease, odours through the activities of highly efficient oxidative microbes resulting in reduced sludge production; also reduced odour and maintenance in pumping stations.
- Reduced maintenance through reduction of grease in lines and traps, often accompanied by reduced BOD values and an overall reduction of odours in the entire collection system.
- Gram + and gram – strains that degrade carbohydrates, proteins and lipids with some strains that are able to reduce the levels of hydrogen sulfide and metabolize various forms of inorganic nitrogen.
- Specialized group of bacteria known as Actinomycetes: that have the ability to degrade complex polymers such as cellulose, chitin, their intermediates and related compounds.
- The Blend of microbes work well in both the aerobic and anaerobic part like the silty sludge layer often found in the Maturation Ponds. This leads to Bad Lab results

How is this done at your plant?

- The microbes are normally added in at the aerator basin. A bottle or jug is simply opened and poured in. There is no need for Oxygenators or any fancy interventions with our products, This addition to the aerator ensures that they immediately find food and Oxygen and get about feeding and breeding and multiplying. This dosing is done by the process controller and is strictly managed. It can also be dosed in the outer ring of the clarifier or directly into the maturation pond system or into oxidation ponds or pits. All they need is human waste as food and will function in low or zero Oxygen environments.
- This multiplying effect carries over to the clarifiers and maturation system as well as accompanying the Return Active Sludge back into the plant's infeed Zone
- Unfortunately dilution from Fresh Influent constantly occurs and it is for this reason that more needs to be added every day.
- Isolated ponds or clarifiers only require 1 slug dose and some time to do their work. I have supplied this for isolated sludge ponds where only one dose is done every 3 months even though waste sludge was added every day.
- Environoc 301 ultimately has a defined usable life and dies off when the food runs out. The food required is excess live or wasted dead sludge. It just needs to stay wet.
- It has been used many times to break down dried sludge in the lagoons. This is food so all that is required is to waste to these dry lagoons after you start with 301 and the rest will take place itself.

Here is an example of Drying bed Sludge remnants or chips.



Before 301 was introduced



After 301 was introduced

Here is something new and proudly my own invention which can be used in pumped Waste Pits to ensure the product is slowly released.



ENVIROGEL



Dropped into a sump
and it slowly releases
even if the pit
empties



I even believe there is potential
to add it to dewatered sludge.

Please feel free to ask any
QUESTIONS

THANK YOU ALL VERY MUCH
Enrico Anelli Reg Pr. Cert Eng