

# THE NEW *RIGHT NOW!*<sup>™</sup> 24 HOUR ENTIRELY AEROBIC NITRIFICATION CYCLE

THIS PAPER IS DEDICATED TO  
LANCE CORPORAL JACK DANIEL HIATT AIRBORNE, ANGLICO, USMC  
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## I. INTRODUCTION

### A. OVERVIEW.

HDL has developed and has been granted US and other patents. HDL has submitted to **Nobel for Science**, on a product which has the unprecedented capability to establish a **Totally Aerobic Nitrogen Cycle** in **24 hours** (instead of **28 days**) in aquarium aquiculture, as well as treat and remediate serious nitrogen, phosphate, and potash pollution in large aqueous systems, whether natural or manmade. This present invention relates to **new** denitrifying **AEROBIC** bacterial compositions and to **aerobic** methods for biological treatment of aqueous systems polluted by nitrogen, phosphate and potash waste products. This paper is intended to supply sufficient information to enable the reader to understand the nature of the problem and to become acquainted with the revolutionary and superior method by which HDL's **RIGHT NOW! BACTERIA** solves it.

### B. BACKGROUND.

1. Water systems commonplace in today's environment, including aquarium aquiculture systems, streams, rivers, ponds, lakes, and ground water. All are subject to contamination by many inorganic and organic compounds, as well as nitrogen waste components, in particular ammonium, nitrites, and nitrates, which at certain concentrations become highly toxic. Municipal wastewater solutions, for example raw sewage and industrial effluents, often contain high levels of ammonium and phenols, cyanides, sulfates, thiocyanates, thiosulfates, as well as other toxic waste compounds. Many spent military explosives contain organonitrate waste, and removing such waste in an economical fashion without contamination of the environment remains a challenge. These nitrogen waste streams are one of the principal major ecological and environmental problems facing mankind, and will continue to pose serious problems as the population grows and waste production increases.

2. As mentioned, aquarium, aquiculture, and ponds are all subject to nitrogen contamination. All biological products for the aquarium, aquiculture and ponds on today's market have exaggerated claims. When tested against the **Nitrogen Cycle**, at the standard temperature of 25°C (77°F) and a reasonable amount of ammonia (5 mg/L, not 1,000 mg/L), few if any have reduced the **Nitrogen Cycle** for less than a week from

the normal 28 days required to establish a bacterial bed.

Another problem is filters. Many filter manufactures have attempted to established their own norms when touting **surface area** of their products. They aspire to compare their surface area against DLS, lava rock, bio balls and silica sand. But when confronted with the real world of the **Specific Surface Area N<sub>2</sub> BET Method**, which is a **world wide standard**, their products fail miserably. The **Specific Surface Area N<sub>2</sub> BET Method** was established by the **American Society of Testing and Materials (ASTM)** and **Semiconductor Equipment and Materials Institute, Inc (SEM)**

## II THE NATURE OF THE PROBLEM

### A. FACTORS WHICH LIMIT THE QUANTITY AND QUALITY OF AQUATIC LIFE.

In any ecosystem, all life has limiting factors. In an aquarium or pond, bacteria life - essential to the nitrogen cycle - have the following limiters:

1. The amount of available food.
2. The amount of accessible oxygen.
3. The total surface platforms to form colonies.
4. Water temperature; and
5. pH range.

### B. THE CHEMICAL COMPOUNDS INVOLVED.

Analyze any ocean, lake, pond, river, or stream with laboratory grade equipment and you will detect some amounts of **Ammonia {NH<sub>3</sub>}**, **Ammonium Hydroxide {NH<sub>4</sub>OH}**, **Ammonium Ion {NH<sub>4</sub><sup>+</sup>}**, **Nitrite {NO<sub>2</sub>}**, and **Nitrates {NO<sub>3</sub>}** **Phosphates** and **Potash**. Aquatic creatures have always lived with very insignificant detectable amounts of these lifeless compounds. The Nitrogen Cycle must be constantly executed, otherwise the water will become polluted and void of life. So what are these compounds and how do they affect aquatic life?

1. **Ammonia . {NH<sub>3</sub>}** is a colorless, very soluble, pungent, suffocating gas. When a great quantity is present, Ammonia Hydroxide displaces the available oxygen and suffocates the fish.

2. **Ammonium Hydroxide {NH<sub>4</sub>OH}** is an alkaline solution obtained chiefly by the catalytic synthesis of nitrogen and hydrogen. Ammonium will destroy living tissue much like Sodium Hydroxide (Lye). When tissue is destroyed, the fish can no longer exchange oxygen.

3. **Ammonium Ion {NH<sub>4</sub><sup>+</sup>}** [**Ammonium Salt**], is the univalent ion [radical] in compounds formed from ammonia. Ammonium Ion behaves similar to an alkali metal, giving rise to ammonium salts. **Ammonium Ion is considered non-toxic.**

4. **Nitrite {NO<sub>2</sub>}** converts to is a weak acid and obtained only in solution.

Nitrous Acid decomposes rapidly to nitric acid and nitrogen dioxide. It is considered a salt or an ester. It inhibits the uptake of oxygen by oxidizing living tissue and causing organ failure.

5. **Nitrate {NO<sub>3</sub>}** Is a salt or ester of nitric acid. At the present time, there are no determined levels of toxicity for fish or invertebrates. Toxic levels have been established for mammals and man. Nitrate reduction to Nitrogen Gas occurs under anaerobic conditions. In the process Hydrogen Sulfate, Methane, Sulphur Dioxide, and Carbon Dioxide are produced. An available carbon source is required for the anaerobic conversion from Nitrates to Nitrogen Gas.

6. **Nitrogen Gas {N<sub>2</sub>}** an odorless invisible chemically inactive gas. Nitrogen Gas forms approximately 4/5 of the atmosphere. The element is vital to living organisms, forming an essential part of proteins and nucleic acids.

### **C. THE SOLUTION**

Here on plant Earth, in any ecosystem, if the inhabitants are to survive, the Nitrogen Cycle must be established and the poisonous nitrogen compounds brought down to tolerable levels. This solution is as true today in ponds and aquaria, as it was four billion years ago when it evolved.

## **III. TRADITIONAL APPROACHES VERSES HDL's AEROBIC BACTERIAL PRODUCT RIGHT NOW!**

### **A. THE TRADITIONAL PRODUCTS**

Aqua-cultures sophisticated enough to understand the need to establish the Nitrogen Cycle have heretofore been limited to stocking their ponds and tanks which is a combination of aerobically and anaerobically organisms, and laboriously establish the Cycle in (under ideal conditions) about 28 days. Realistically, the time period is generally closer to seven weeks than to four. During this time deadly spikes of Ammonia, Ammonium, and Nitrite can occur. This possibility necessitates water changes, otherwise, the organisms living in the aquatic environment will perish. You may have experienced significant losses and customer dissatisfaction as a result of these mortal spikes.

**Even with the additives on the market, it still takes an average of 4 to 6 weeks to balance the aquarium where by one can introduce a full load in their system.**

### **B. THE RIGHT NOW! METHOD**

#### **1. DESCRIPTION**

**RIGHT NOW! BACTERIA** is a totally different way of addressing the Nitrogen

Cycle. Instead of 28 days, following our protocol at 30°C, the Nitrogen Cycle ***will be established in one day every time***. Nor will deadly spikes of ammonia, ammonium or nitrite occur. Because of the rapidity of conversion of toxic ammonia and ammonium to ammonium ion, **the test kit will register ammonium but the tank or pond will not have dead fish**. Instead of the gradual increase of nitrates, the nitrates **will be reduced aerobically** and will settle between 0 to 2 mg/L. Sludge will be vastly reduced, copper will not exterminate the cycle for it is bio-resistance to copper at 100 mg/l and eight other heavy metals. When used in conjunction HDL's METAL GONE® which reduces 28 heavy metals (including phosphorous) and takes up 10 times more ammonium than Zeolite, **RIGHT NOW!** will consume deadly **EUTROPHICATION** within 4 TO 6 weeks.

	CYCLE TIME	PHOSPHORUS REMOVAL	COPPER RESISTANCE	SLUDGE REDUCTION	EUTROPHICATION REDUCTION	OIL CONSUMPTION	AEROBIC NITRATE REDUCTION
<b>RIGHT NOW!</b>	24 HOURS	YES	YES	YES	YES	YES	Yes
<b>OTHER PRODUCTS</b>	1-8 WEEKS	NO	NO	NO	NO	NO	NO

## 2. AVAILABLE CARBON SOURCE

An available carbon source is required for **RIGHT NOW! BACTERIA** for the **AEROBIC** reduction of Nitrates. This available carbon source is called Total Organic Carbon (TOC). TOC's are the amount of carbon bound in organic compounds in a water sample as determined by a standard laboratory test. It is specified in mg/L. The CO<sub>2</sub> is measured with a water sample. The sample is atomized in a combustion chamber. TOC is a very fine measurement used in sophisticated water treatment systems, such as electronics grade, where any micro contamination can adversely affect product quality.

The choice for the TOC in this cycle is **TRI-BASE PELLETIZED CARBON**. This carbon in each pellet contains three different types of carbonized material. The advantages of this material versus other carbonized material are as follows:

- 1) The Pellet form does not allow channeling.
- 2) The Pellet form does not allow anaerobic build up.
- 3) The proprietary carbon source allows the **AEROBIC** conversion of Nitrates to Nitrogen Gas.
- 4) This Pellet bed will last as a biological and carbon source until depleted, providing a pre-filter is employed. Do not confuse this with chemical reduction.
- 5) This vast surface area of TOC allows Bacteria counts per gram from  $1 \times 10^9$  to  $1 \times 10^{11}$  versus silica sand or anthracite coal which support population densities of  $1 \times 10^6$  to  $1 \times 10^7$ . (E.g.  $1 \times 10^{11} = 1,000,000,000,000$ )

### 3. SURFACE AREA

Surface area is **crucial** in any aquatic system. This leads us to a point we have already stated: many products on the market **compare non-standards** against their products, thus pseudo-validating their claims to the unsuspecting consumer and invalidating their **CLAIMS** to the professional community. Let us compare the different media's surface areas:

- 1) Bio Ball's surface area is 100 cubic **feet** for every cubic **foot** of material. Does not contain the available carbon source.
- 2) Lava Rock's surface area is approximately 315 **meters squared per gram**. Does not contain the available carbon source.
- 3) Silica Sand is approximately 390 **meters squared per gram**. Does not contain the available carbon source.
- 4) Aquarium activated Carbon is approximately 650 **meters squared per gram**. Does not contain the available carbon source.
- 5) Tri-Base Pelletized Carbon surface area is approximately **1,150 meters squared per gram**. Tri-Base Pelletized Carbon **DOES** contains an available carbon source.

Within a two week period, at 30°C, for every pound of **TRI BASE PELLETTIZED CARBON**, ***one pound*** of **RIGHT NOW! BACTERIA** will be established in the aquatic environment. This is more than adequate for any system for the reduction of Nitrogenous and other waste and the aerobic reduction of Nitrates to nitrogen gas. If the desire is to increase fish population densities, more carbon must be added. *The least amount of carbon necessary for aerobic nitrate conversion is .1667 x gals of water = pounds of TRI BASE PELLETTIZED CARBON.*

### 4. DISSOLVED OXYGEN

The amount of Dissolved Oxygen [DO] will limit the carrying capacity of any system. Thus when you limit the amount of **DO**, you limit the amount of bacteria. Increased aeration or the injection of oxygen into the aquatic solution is necessary. Elevated **pH** and temperatures, decrease the water's ability to carry and maintain a high [DO] Dissolved Oxygen.

### 5. pH

If the **pH** is not within the range of the target organism (i.e. fish) normally the bacteria that coexist with those organisms are limited to the same **pH** range. **RIGHT NOW! BACTERIA** has an active **pH** range from **3.0 to 10.5**. It's optimum **pH** range is between **5.5 to 9.0**. This ensures if a sudden elevation or drop in **pH**, for what ever reason, the bacterial bed will not decline or perish.

## 6. TEMPERATURE

All organisms function within a specific temperature spectrum. Some - such as the normal nitrification bacteria - have a narrow temperature range in which they can survive. **RIGHT NOW! BACTERIA** have a **working range** from 5°C (41°F) to 68°C (155°F). The lower the temperatures the longer time it takes to establish the bacterial bed. The higher the temperatures, the faster the bed is established. Normal Nitrogen Cycle Bacteria replicates every thirty minutes. **RIGHT NOW! BACTERIA** at 30°C, replicates every 10 - 15 minutes. With HDL's Bacteria Super Duper, this time is furthered reduced to 5 - 7 minutes.

Temp (F)	41	55	65	75	77	80
Days	20	10	7	2	1	0.5

At 30°C, .1 gram of **RIGHT NOW! BACTERIA** will constitute a colony at a population density of  $867 \times 10^8$  organisms in eight hours.

## 7. FOOD SOURCE

As with all living organisms, bacteria need adequate food. This is not usually a problem in the pond or aquarium. Fish keepers often over stock or over feed their systems. The simple remedy is to not over feed. And, if the pond is over burdened with nitrogen waste, adding more carbonous material to the filter bed will increase the total amount of bio-mass. Thus the additional **RIGHT NOW! BACTERIA** will consume the waste from over feeding.

## 8. COPPER RESISTANCE

Copper in many forms is used to destroy parasites. When the prophylactic level of 1.5 mg/L is utilized, not only does copper exterminate the parasite, but also destroys the bacterial bed. **RIGHT NOW! BACTERIA** will persist at levels of 100 mg/L and up to 1,800 mg/L of TOXIC heavy metals. The metals include, but are not limited to chrome, (hex and trivalent) cadmium, arsenic, copper, iron, lead, tin, zinc, cobalt, selenium, and silver.

## 9. PHOSPHORUS REMOVAL

Since an article expressing the demerits of Phosphorus was published, the aquatic world has been in an uproar against that element. Numerous methods have attempted to reduce phosphorus, but they are expensive and time consuming. When following our protocol, and used in conjunction with HDL'S METAL GONE®, **RIGHT NOW! BACTERIA** will CONSUME Phosphorus and maintain it at an acceptable level.

Many people do not understand that every fish food is a constant source of phosphorus.

## 10. DEADLY EUTROPHICATION

DEADLY EUTROPHICATION is a bane to aquaria. When **RIGHT NOW! BACTERIA** is utilized with HDL'S METAL GONE®, following our protocol, **RIGHT NOW! BACTERIA** will consume DEADLY EUTROPHICATION, Right Now! will not harm higher plants.

## 11. SLUDGE REDUCTION

Debris or Sludge Reduction not only enhances the appearance of any aquatic system, but decrease the bio load and the maintenance of the system. **RIGHT NOW! BACTERIA** was tested at the Laboratory of the TERMINAL ISLAND TREATMENT PLANT, Los Angeles, California. Their target reduction of total solids was aimed at 7 mg/L. **RIGHT NOW! BACTERIA** reduced their sludge to 1 mg/L. The following test demonstrates the effectiveness of **RIGHT NOW! BACTERIA** for sludge reduction.

<u>Time(hr)</u>	<u>Sample Volume</u>	<u>Dried Mass (g)</u>	<u>Solids (mg/L)</u>
0/I	500 ml	43	9
0/E	500 ml	36	7
24/I	500 ml	28	6
24/E	500 ml	10	2
144/I	500 ml	25	5
144/E	500 ml	5	1

## 12. NITROGEN, PHOSPHATE and POTASH WASTE REMOVAL

Many products claim to reduce Ammonia, and Nitrites. Yet, when put to the scientific testing method, unless the test is spurious, the bacteria will reduce Ammonia and Nitrites over a two or three week period, or not at all. **RIGHT NOW! BACTERIA** will not only quickly reduce **AMMONIA HYDROXIDE** and **AMMONIUM HYDROXIDE** to the **NON-TOXIC AMMONIUM ION**, but further reduce by biological oxidation **NITRITES** and **NITRATES AEROBICALLY** to **NITROGEN GAS**. Thus no **off-gassing** of deadly **HYDROGEN SULFATE**, **SULFUR DIOXIDE** and **METHANE GAS** can occur. Anaerobic Bacteria produces 2 ATP per gram of glucose rather than **AEROBIC BACTERIA** produces

32 ATP per gram of glucose when reducing Nitrates. The following test results from an Certified California Environmental Laboratory shows the rapid reduction of these poisonous compounds.

**EVERY TIME 4 VALUES OF NITROGEN WASTE ARE REDUCED, 1 VALUE OF PHOSPHATE AND POTASH ARE CONCURRENTLY REDUCED.**

#### IV. SUMMARY

The revolutionary HDL's product ***RIGHT NOW!***, when used with the recommended protocol, will reduce - from a month to ***one day*** - the time in which the life - giving Nitrogen Cycle can be established in a pond or aquarium, with greatly reduced fish mortality. Enhanced customer satisfaction, and increased profits. For those interested in specific test results, those of **Inchape Testing Services (Caleb Brett)**, 1996 are attached. Sold only to wholesalers and distributors.

Respectfully submitted,

HDL

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William Nicholas "Snake" Hiatt  
Environmental R&D Director

**Inchape Testing Services**  
**Caleb Brett**

### **REPORT OF ANALYSIS**

Vessel	: ---
Port/Terminal	: ---
Client Reference	: ---
Our Reference	: LA/96-25745
Date Sample Taken	: ---
Date Submitted	: 04/28/96
Date Tested	: 04/30/96 TO 05/03/96
Sample Designated As	: RIGHT NOW BACTERIA
Drawn By	: AS SUBMITTED
Representing	: ---
Lab Reference	: 96-----

<b>Starting Concentrations</b>	<b>04/30/96</b>	<b>05/01/96</b>	<b>05/02/96</b>	<b>05/03/96</b>
<b>TEST</b>	<b>1445 HRS</b>	<b>1800 HRS</b>	<b>1700 HRS</b>	<b>1545 HRS</b>

Ammonia Nitrogen, mg/L:	0.9	1.0	0.4	0.2
Nitrogen Nitrate, mg/L:	22.0	3.52	6.6	4.4
Nitrogen Nitrite, mg/L:	1.5	1.5	0.75	0.3
Sodium Nitrite, mg/L:	7.5	7.5	3.75	1.5

**C.M. Dean**  
**ITS - Caleb Brett**  
**1941 Freeman**  
**Signal Hill, CA 90804**  
**562 494 4999**  
**Fax 562 985 3469**

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