# MEDIA BACKGROUNDER

**June 10, 2009**

## THE COMPANY

Ostara Nutrient Recovery Technologies Inc. is a Vancouver-based company founded in 2005 to develop and commercialize proprietary technologies that recover nutrients from liquid sewage and recycle them into environmentally-friendly slow release fertilizer, called Crystal Green®.

Ostara's technology, named PEARL™ Nutrient Recycling Process, reduces the amount of pollutants released into the environment, helps sewage treatment plants reduce operating costs and meet environmental regulations and provides municipalities with revenue from the sale of the recycled fertilizer.

Ostara's core technology was developed at the University of British Columbia (UBC) over a period of five years. Phillip Abrary, President and CEO, and Ted Jones, COO, founded the Company and the Ostara technology was licensed from UBC in 2005. Shareholders include UBC, VantagePoint Venture Partners, a leading international cleantech investor based in Silicon Valley, California, and Frog Capital, a London-based venture investor that focuses on environmental and clean technology. Environmental advocate and lawyer Robert F. Kennedy Jr. joined Ostara's Board of Directors in February 2009.

## COMMERCIALIZATION

The Company estimates that approximately 200 plants in North America and several hundred plants in Europe and the rest of the world are candidates for the Ostara technology.

The City of Edmonton was the first customer for Ostara's technology. Ostara operated a successful pilot plant in 2006 and commissioned a full-scale demonstration reactor at the Gold Bar wastewater plant in 2007.

The first full-scale commercial Ostara nutrient recovery facility began operating in spring 2009 near Portland, Oregon, at the Clean Water Services' Durham Advanced Wastewater Treatment Facility in Tigard, Oregon. Crystal Green® is currently being marketed through national and regional commercial fertilizer distributors. An Ostara pilot plant demonstrated the technology at Clean Water Services' Durham Facility in 2007.

In addition to Edmonton and Portland (Tigard), Ostara has completed pilot plant demonstrations of the technology for several other potential customers, including San Francisco in 2008 and Suffolk, Virginia, in 2007.

## BUSINESS MODEL

Ostara offers municipalities two business models to incorporate Ostara technology into their wastewater treatment plant.

- In the capital-based model, the municipality pays the capital and construction costs for the Ostara nutrient treatment facility and owns and operates the completed facility. The municipality's investment is paid back over approximately five years from a combination of revenue from the sale of the fertilizer by-product, increased plant capacity and reduced maintenance costs.

- In the fee-based model, the municipality does not pay the construction or capital costs of the Ostara nutrient treatment facility, or the ongoing operating costs. Ostara is reimbursed for all construction and capital costs, plus the Company's profit margin, from a negotiated fee paid by the municipality over 10-15 years. This fee is calculated from a share of the wastewater plant's operating and maintenance cost savings attributed to the Ostara nutrient treatment facility. In addition, all operating costs for the Ostara nutrient treatment facility are covered by the municipality's share of the revenue of the by-product fertilizer.

For a typical wastewater treatment plant serving one million people, net cost savings of incorporating the Ostara process can exceed $1 million per year. These savings are achieved by:

- Preventing plant downtime and maintenance costs of cleaning clogged pipes, pumps, and other equipment throughout the wastewater plant;
- Reduced sludge volumes and reduced disposal costs;
- Improved overall system reliability through reduced nutrient loadings and discharge; and,
- Revenues from Crystal Green® fertilizer produced by the Ostara reactor.

**THE TECHNOLOGY**

Ostara's core technology, PEARL™, was developed at UBC's Civil Engineering Department by the Pollution Control and Waste Management group. The research team arrived at a proprietary fluidized bed reactor design which not only removed in excess of 85 per cent of the influent phosphorus, but also resulted in the formation of a highly pure, slow release fertilizer in granular form consistent with that used in the fertilizer industry.

Pilot-scale reactors have been operated at more than 10 municipalities across North America over the past eight years, and a pilot project will begin in the United Kingdom in summer 2009. The technology has also passed performance tests at a number of industrial wastewater treatment sites including corn ethanol production plants and greenhouses. The technology development was also supported by BC Hydro, Stantec Inc., the Natural Sciences and Engineering Research Council (NSERC), the National Research Council (NRC) and Sustainable Development Technology Canada (SDTC).

Wastewater treatment plants, particularly plants that practice biological nutrient removal, concentrate large quantities of nitrogen and phosphorus in their sludge handling streams. These dissolved nutrients combine with magnesium to form struvite scale in piping, pumps and valves. This scale has an appearance and strength similar to concrete and must be removed either mechanically (using chisels or jackhammers) or through flushing of the affected pipelines with strong acids. Plugging of the piping systems leads to pumping inefficiencies, reduced system capacity, high operating costs, maintenance shutdowns and pipeline failures.

The size of the problem varies from one wastewater treatment plant to another. For a typical wastewater treatment plant serving one million people, the annual cost of dealing with the problems caused by concentrated dissolved nutrients can easily exceed $1 million per year. Plants where biological phosphorus (Bio P) removal is practiced tend to experience even higher costs.

In addition to solving costly struvite scaling problems at the wastewater treatment plant, Ostara's technology reduces the amount of nutrients (ammonia and phosphate) in the sewage sludge liquids (that have to be treated) thereby resulting in 20% to 50% reduction in the total nutrient loading on the plant. This additional capacity enables the treatment plant to better meet its nutrient discharge limits.

## THE ENVIRONMENTAL IMPACT

The increasing accumulation of nutrients, such as phosphorus and nitrogen, discharged into the environment is one of the most significant environmental challenges facing the planet, according to the 2005 United Nations Millennium Ecosystem Assessment. Ostara's proprietary solution to this environmental challenge offers the Company access to a multi-billion dollar global market.

Each year more than 100 million tons of phosphate rock are mined and processed into fertilizer. Over time this fertilizer enters the ecosystem as waste and agricultural runoff, leading to excessive nutrient levels, or a condition known as eutrophication. Eutrophication causes excessive algae growth in lakes, streams and oceans which depletes the oxygen supply in the water that is necessary to support aquatic life.

Ostara's fertilizer (Crystal Green®) is in a slow release form, which reduces the amount of fertilizer lost through runoff into the environment.

In addition to reducing phosphorus runoff into the environment, Ostara's wastewater plant customers and Crystal Green® customers contribute to environmentally sustainable development and to the reduction of greenhouse gases.

Phosphorus is an essential ingredient in fertilizer and, therefore, critical to the world's food supply. However, the conventional phosphorus fertilizer production cycle is an energy-intensive process that releases greenhouse gases into the environment at every stage: 1) mining of phosphorus ore, 2) concentration into phosphate rock, 3) transportation from mine sites around the world, 4) centralized manufacture into fertilizer, and 5) transportation to customers.

Conversely, Ostara recovers phosphorus from sewage sludge that would otherwise be wasted — either incinerated or dumped on landfills, both with negative environmental consequences. Heat needed to dry the Crystal Green® fertilizer pellets is recovered from the host wastewater treatment plant.

## PRODUCTS

Ostara has developed two core products: PEARL™ and Crystal Green®.

PEARL™ is a nutrient recycling process with the following key benefits:

- Reduces and eliminates operating costs associated with the maintenance of clogged pipes, pumps, and other equipment;
- Reduces sludge volumes and the associated disposal costs;
- Improves process reliability through reduced nutrient loadings and discharge; and,
- Allows wastewater treatment plants to generate revenue from an environmental solution.

Crystal Green® is a slow release fertilizer with a high nutrient payload. Because 84 per cent of the product's raw materials are derived from waste recovered in PEARL™ systems, Crystal Green® has low production costs compared with fertilizers produced from mined phosphorus. Crystal Green® also has significantly lower contaminant levels than other commercial fertilizers, requires minimal processing after recovery from PEARL™ systems and is easy to store. It is being marketed as a recycled and environmentally-friendly product.

Struvite is the mineral name for the fertilizer that is produced from PEARL™ systems. Its chemical formula is $MgNH_4PO_4 \cdot 6H_2O$ and its fertilizer grade is 5-28-0 (N-P-K) + 10% Mg. Struvite deposits were first identified in piping systems at wastewater treatment plants in the 1970's.

Crystal Green® fertilizer's combination of nitrogen, phosphorus and magnesium is a rare combination in the fertilizer market, and will be particularly valuable in conditions where phosphorus and magnesium-deficient growing media or soils are used and where slow release properties are valued. Limited production volumes and high value will dictate that the Crystal Green® fertilizer will be sold into specific niche markets, and not into the bulk commodity fertilizer markets.

Performance growing trials by university crop scientists and commercial fertilizer distributors have identified several uses for Crystal Green® including: turf grass, golf courses, high value food crops (such as berries and tree fruits), salmon habitat enhancement, forestry silviculture, horticulture, and container nurseries. Crystal Green® will be marketed through national and regional commercial fertilizer distributors.

Tests carried out by the British Columbia Ministry of Water, Land and Air Protection and by Ostara show that Crystal Green® contains negligible levels of heavy metals which are significantly lower than that found in competing commercial fertilizers. These tests also confirmed that no organic contaminants were found in the Crystal Green® samples. Crystal Green® is composed of more than 99 per cent pure struvite, with traces of calcium, iron and other micronutrients.

Although other phosphate recovery technologies are being developed around the world, Ostara's PEARL™ technology has a significant competitive advantage because it produces significantly larger and purer struvite granules.

## MANAGEMENT

### *F. Phillip Abrary (BSC. CA), President, Chief Executive Officer and Director*

Mr. Abrary has more than 20 years of financial management and executive experience and is a founder of Ostara. His business experience includes president and founder of RTM Norden Inc. (1995 – 2005), an international business and technology consulting firm working with the manufacturing sector throughout North America and Europe, and at Price Waterhouse (1990 – 1995) working with private, public and multinational corporations.

### *Ahren T. Britton (MSc, P.Eng), Chief Technology Officer*

Mr. Britton is a co-inventor of Ostara's technology and has more than eight years experience in environmental engineering, specifically focused on the wastewater treatment industry. Mr. Britton designed, built and tested the first prototype of Ostara's nutrient recovery technology as part of his master's degree research at UBC. His professional experience includes direction of a number of experimental and commercial scale process demonstrations within the wastewater industry. Mr. Britton has managed the design and construction of Ostara's full scale plant in Edmonton. This combination of experience and education makes Mr. Britton one of few experts in nutrient recovery from wastewater in North America.

### *Jim Zablocki (MSc), Vice President Nutrient Operations*

Mr. Zablocki has worked in the fertilizer industry for more than 30 years specializing in slow release fertilizers. He has written a number of scientific papers and has been a consultant for government agencies regarding nutrient management programs. He has served in management positions with W. R. Grace & Co., the global specialty chemicals and materials company, and with the Scotts Company, the leading supplier of lawn care and garden care products in North America and a major supplier in other markets, including Europe. His work with these companies included developing formulations and blends, as well as evaluating new technologies, coatings, substrates, and release profiles.

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