UNITED STATES DISTRICT COURT
DISTRICT OF CONNECTICUT

CLEARWATER SYSTEMS CORPORATION, Plaintiff, v. EVAPCO, INC. and JOHN W. LANE, Defendants.	CIVIL ACTION NO. 3:05cv507 (SRU)

MEMORANDUM OF DECISION

Clearwater Systems Corporation ("Clearwater") seeks to enjoin EVAPCO, Inc. ("EVAPCO") and John W. Lane from using Clearwater's trade secrets concerning the non-chemical treatment of water used in heating and cooling systems. Clearwater's claim for injunctive relief was tried to the court over approximately four days.[1] Pursuant to Rule 52 of the Federal Rules of Civil Procedure, the court's findings of fact and conclusions of law are set forth below.

I. Background

A. Water Treatment

The temperature of many large buildings is controlled by circulating water. For example, the temperature of a building can be lowered by chilling water outside the building in a "cooling tower" and then circulating the cooled water through the building so it can absorb the building's ambient heat. Similarly, a building's temperature can be raised by heating water in a "boiler" and then circulating the heated water through the building so that the building's air absorbs the

[1] Originally Clearwater moved for a preliminary injunction. With the consent of the parties, I consolidated a hearing on that motion with trial on the merits of Clearwater's claim for injunctive relief. *See* Fed. R. Civ. P. 65(a)(2).

heat from the water.

In these systems – collectively known as "heating, ventilation, and air-conditioning" systems or "HVAC" systems – the same water is constantly recirculated, with only small amounts of water being drained from or added to the system. Because the same water is used over and over again, it is crucial to a system's functioning that the water be kept free of contaminants. In particular, chemical and biological contaminants can cause (a) scale, i.e., buildup of matter on the surfaces of the system, which can foul the working of the system; (b) rust, i.e., oxidation of the metallic components of the system, which can decrease their efficiency; and (c) biological hazards, such as bacterial growth, which can pose health risks to people in the cooled or heated building.

In order to prevent the problems of scale, rust, and biological hazards, the water used in HVAC systems must be treated to prevent the buildup of chemical and biological contaminants. In the majority of HVAC systems, water is treated with various chemicals that inhibit scale, rust and biological growth. Nevertheless, there is a market for the non-chemical treatment of water because some believe non-chemical treatment is cheaper and more environmentally friendly than chemical treatment.

Non-chemical water treatment systems typically subject the circulating water to either electric fields, magnetic fields, or both. The general theory behind such systems is that the fields will affect contaminants in a way that prevents scale, rust, and biological growth. Although there is some empirical evidence supporting the effectiveness of certain non-chemical water treatment systems, why such systems work is not well understood. Theories abound, but there is no definitive explanation for the beneficial effects of non-chemical water treatment systems.

B. Clearwater and EVAPCO

Clearwater is a small Connecticut company in the business of non-chemical water treatment. Clearwater manufactures a non-chemical water treatment device known as "The Dolphin System" or "Dolphin," for short. Clearwater has sold Dolphins since its formation in 1997. Clearwater's first model was the Dolphin 1000, and it has since produced a Dolphin 2000 and Dolphin 3000. The details of the Dolphin's structure and operation will be discussed below, but, in general, it treats water by subjecting the water to fluctuating electric and magnetic fields.

There is empirical evidence that the Dolphin is effective in preventing scale, rust, and bacterial growth in HVAC systems. There is also some evidence that suggests the Dolphin may be more effective than other non-chemical water treatment systems. Nevertheless, *why* the Dolphin works has been a mystery even to Clearwater. Much of Clearwater's research has focused on that question, and, because Clearwater has not arrived at a definitive answer, its ability to improve the Dolphin has been limited. Each change to the fundamental structure of the Dolphin runs the risk of fatally undermining the unexplained effectiveness of the device. Consequently, though Clearwater has manufactured three models of Dolphins, they primarily differ only in the way they generate high frequency fields, and otherwise retain an almost identical overall structure.

EVAPCO is a large Maryland company whose primary business is the sale of water cooling towers for use in HVAC systems. Because HVAC systems use recirculating water, treatment of that water is an important subject for EVAPCO. For a number of years, EVAPCO has been interested in the field of non-chemical water treatment, and, more recently, it decided to come up with its own non-chemical water treatment system. To that end, in 2004, EVAPCO

looked into the possibility of acquiring Clearwater. The two companies were not, however, able to reach an agreement.

Sometime during its negotiations with Clearwater, when the prospects of a successful acquisition appeared dim, EVAPCO offered a job to Clearwater's Vice President of Technology, John Lane. Lane had worked with Clearwater almost since its formation and had been heavily involved in the development of the Dolphin 2000 and 3000. In November 2004, Lane accepted EVAPCO's offer. Shortly thereafter, he began developing a non-chemical water treatment device for EVAPCO.

Clearwater's concern, and the basis for this litigation, is that Lane has used or disclosed Clearwater's trade secrets in his work for EVAPCO, or that he will do so in the future.

C. The Dolphin

The Dolphin is composed of four lengths of wire loops or "coils" wrapped around a segment of water-carrying PVC pipe. Three of the coils are positioned next to each other on the pipe, and a fourth is positioned around the central coil, making a double coil. All the coils are wired together, and the whole system is wired to a transformer that is in turn connected to a standard power outlet. The arrangement is illustrated in Figure 1.[2]

Clearwater did not invent the structure of the Dolphin. The first model Dolphin, the Dolphin 1000, is a nearly exact duplicate of an earlier device, invented by Salvatore Pandolfo, known as "the Parrot." Subsequent Dolphin models differ primarily in the switch used for generating high-frequency fields. In all other material respects the Dolphin models are virtually indistinguishable from the Parrot.

[2] All figures are contained in Appendix A of this opinion

The general effect of the Dolphin (and the Parrot) is to impose various electric and magnetic fields on the water that flows through the length of pipe. There are five effects resulting from the Dolphin's configuration that are relevant to this case, two of which are claimed as trade secrets. The relevant effects are: (1) the creation of an axial magnetic field; (2) the creation of a radial magnetic field; (3) the creation of an induced electric field; (4) the creation of brief high frequency fluctuations of the generated electric and magnetic fields; and (5) the creation of an axial electric field between adjacent coils. Each effect requires explanation.

In addition, Clearwater conducted some brief research into the effect, if any, that water turbulence would have on the Dolphin's performance. Clearwater claims that the result of that research is a trade secret.

1. *Axial Magnetic Field*

When electric current passes through a wire, a magnetic field is generated around the wire. The strength of the magnetic field is proportional to the amount of current passing through the wire. The shape and direction[3] of the magnetic field depend on the shape of the wire and on the direction of the current flowing through the wire. When a current-carrying wire is wrapped several times around a cylinder, creating a coil, the coil will generate a magnetic field. Inside the coil, the magnetic field runs almost perfectly parallel to the coil's axis. As it exits the coil, the

[3] At various points, I will discuss the "direction" of a particular field. It bears mentioning that the direction of an electric or magnetic field does not refer to actual movement in the field. Rather, it refers to the direction of the force that would be applied to a suitably sensitive particle – an electric particle or ferromagnetic material, depending on the field – were it placed at that location in the field. This is comparable to the way we refer to the "direction" of the Earth's gravitational field as "towards the center of the Earth." By that we only mean that, if an object with mass is placed in the Earth's gravitational field, it will (in the absence of other forces) move towards the center of the Earth. We do not mean that the field itself is moving towards the center of the Earth.

field curves out and loops back on itself.[4] Such current-carrying coils are sometimes referred to as "solenoids," and the field generated by such a coil is referred to as a "solenoidal" field. A solenoidal field is illustrated by Figure 2.

When current is passed through the Dolphin, each of its four coils generates a solenoidal field, which, as with all solenoidal fields, is directed almost entirely axially through the inside of the pipe. Thus, the water flowing through the pipe of the Dolphin is exposed to an axial magnetic field.[5]

2. *Radial Magnetic Field*

In the previous section, I described the water flowing through the Dolphin's pipe as being exposed to an "almost entirely" axial field. The field is not *entirely* axial, as can be seen in Figure 2, because, when the field exits the coil, it curves out. At any point along that curve, the field can be thought of as the sum of two directional components: an axial component, pointing in the direction of the pipe, and a radial component pointing perpendicular to the pipe.

Although three of the coils in the Dolphin generate magnetic fields with identical directions, the fourth coil, which sits on one of the ends of the device, generates a field that points partially in the opposite direction. Specifically, the axial component of the solenoidal

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[4] Which way the field will be directed in and around the coil, i.e., the field's "polarity," depends on the direction of the current flowing through the coil. For the most part, the polarity of the fields in the Dolphin is not relevant to this case, so I do not discuss that property. Where it is important to discuss the relative polarity of two fields, I simply describe the fields as pointing in the "same" or "opposite" directions.

[5] Clearwater's expert, Mark N. Horenstein, explained that the relevant property is actually not the "magnetic field" but the "magnetic flux density," a physical quantity that is proportional to, but not equal to, the magnetic field. (Horenstein Report ¶¶ 20-21) As Horenstein acknowledged, the distinction is not material to this case. *Id.*

field generated by the fourth coil points in the opposite direction of the axial components of the solenoidal fields generated by the other three coils.[6] The radial components of the fields, however, point in the same direction. This leads to a somewhat unusual field configuration at the place where the curved part of the fourth coil's field meets the curved part of the other fields.

When two magnetic fields overlap, the strength of the field at any point is the combined strength of the individual fields. If the fields point in the same direction, then the combined strength is the sum of the two fields. If the fields point in opposite directions, the combined strength is the difference between the two fields. Thus, if two axial magnetic fields of equal magnitude but opposite direction overlapped, there would be no magnetic force at the points of overlap. Conversely, if the overlapping fields have equal magnitude and the same direction, the points of overlap would have twice the magnitude of each individual field.

Calculating the combined strength of the Dolphin's opposing fields is slightly more complicated because the fields are only partially opposing. That is, the axial components of the field are of opposite direction, but the radial components have the same direction. The resultant field, however, is fairly easy to calculate by considering the axial and radial components separately. Thus, the axial component's magnitude is the difference between the two combined axial components, and the radial component's magnitude is the sum. As a result, the water in the pipe flowing in the space between the three similarly directed coils and the one opposing coil is exposed to a relatively strong radial magnetic field (because the two overlapping radial field components are added) and a relatively weak axial magnetic field (because the two overlapping

[6] The parties sometimes referred to the fourth coil as a "bucking" coil to indicate the opposing direction of its magnetic field.

axial field components are subtracted).

3. *Induced Electric Field*

When a magnetic field changes in magnitude or direction over time, it generates an electric field that is perpendicular to the direction of the magnetic field.[7] The magnitude of the induced electric field depends on the rate of change of the magnetic field.

As explained above, the Dolphin generates an axial magnetic field inside the pipe, and the magnitude of that field depends on the amount of current running through the generating coils. If that current were constant, then the magnitude of the axial magnetic field would be constant. The current running through the Dolphin, however, is alternating current or "*ac*" current, that is, the amount of current is constantly fluctuating between a maximum and a minimum, and therefore the magnitude of the axial magnetic field generated by the Dolphin's coils also fluctuates. Because the axial magnetic field in the Dolphin is fluctuating, it generates an induced electric field inside the pipe. Thus, the water inside the pipe is exposed to an induced electric field.

In addition, there is an induced electric field outside the pipe and in the spaces between the coils of the pipe where the magnetic field curves, because the entire solenoidal field is fluctuating, not just its axial component.

4. *High Frequency Fields*

a. Resonating Circuits

A circuit composed of an inductor and a capacitor, when suitably excited, will resonate at

[7] The polarity of that induced field and the shape of the field – which both sides described as "circumferential" – is not relevant to this case.

a particular frequency. That phenomenon requires some explanation.

Inductors. A coil of current-carrying wire, or solenoid, is often functionally described as an "inductor," which, in electric circuit theory, is designated by the letter *L*. As discussed above, when current passes through an inductor, it generates a magnetic field around the inductor. If the current is increased, the magnitude of the magnetic field also increases. Inductors also possess a complementary property, namely, when the magnetic field surrounding an inductor decreases or "collapses" – for example because the current has been cut-off – the collapsing field generates a current through the inductor.[8] Consequently, it is sometimes said that an inductor "stores" energy in its surrounding magnetic field, and, when that field collapses, the stored energy is converted into current.

Capacitors. When non-conducting material, an "insulator," is placed in a circuit, positive charge builds up on one side of the insulator and equal, negative charge builds up on the other. The built-up charge on either side of the insulator gives rise to an electric field across the insulator. The magnitude of the electric field is proportional to the voltage across the insulator and inversely proportional to the distance between the two sides of the insulator. This combination of elements – i.e., two conductors separated by an insulator – is, in circuit theory, called a "capacitor" and is designated by the letter *C*. A capacitor is illustrated in Figure 3. When the two conducting sides of a capacitor are connected, current will flow between them. Consequently, it is sometimes said that a capacitor "stores" energy in its electric field, and, when the conducting ends of the capacitor are connected, the stored energy is converted into current.

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[8] This phenomenon is, in fact, the result of the same principle that gives rise to the "induced electric field" discussed above.

Thus, both inductors and capacitors store energy, though an inductor stores energy in its generated magnetic field, and a capacitor stores energy in its generated electric field.

If a capacitor is "charged up," for example by applying a temporary current to it, and then connected to an inductor, the resulting circuit – known as an *LC* circuit – exhibits a property known as resonance.[9] The charged capacitor, once connected to the inductor, will discharge its energy in the form of current. That current will generate a magnetic field in the inductor. That magnetic field, when it collapses, will generate a current, which will re-charge the capacitor. The capacitor will then discharge, and regenerate the magnetic field in the inductor, which will restart the cycle. Thus, for every cycle, the energy is passed back and forth, via current, between the capacitor's electric field and the inductor's magnetic field. In theory, this cycle could repeat forever, however, as a practical matter, the inherent resistance in any actual *LC* circuit will cause the oscillations to diminish over time.

The frequency at which a given *LC* circuit repeats this cycle, or "resonates," depends on the nature of the particular inductor and capacitor used in the circuit. The resonant frequency of a given *LC* circuit will often be much higher than the frequency of the current used to charge the circuit initially.

b. Resonance in the Dolphin

The Dolphin takes advantage of the last point – that resonant frequencies are often much higher than their generating current's frequency – to generate brief, high-frequency fields during its operation. This feature of the Dolphin is patented.

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[9] The same thing happens if an inductor is "charged" by application of temporary current, and then connected to a capacitor.

As explained above, the Dolphin consists of an alternating current, running through four coils, which generate solenoidal magnetic and induced electric fields. The Dolphin also contains a switch that periodically cuts off the current to the coils for a brief period of time.[10]

The four coils in the Dolphin are inductors, and therefore, while current flows through the Dolphin, they are storing energy in their surrounding magnetic fields. When the current to the Dolphin is briefly interrupted by the switch, the fields around the inductors collapse, causing current to run through the inductors. Accordingly, as described above, if a capacitor was connected to the Dolphin's inductors, after the Dolphin's current was cut-off, what would remain would be a basic *LC* circuit, which would resonate.

Although the Dolphin does not contain a capacitor, it nevertheless resonates. When the Dolphin's switch cuts off the current, the energy in the fields generated by the Dolphin resonate or "ring" at a very high frequency. The obvious question, then, is what causes the resonance, if there is no capacitor in the Dolphin. The answer is that the Dolphin has a sort of inherent capacitor, which allows it to resonate when its current is interrupted.

The fact of the Dolphin's inherent capacitance is undisputed, otherwise the device would not ring. Moreover, although the record is not perfectly clear on the source of that capacitance, it appears to be generally agreed that the source of the Dolphin's capacitance is its coils.

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[10] The exact nature of this switch has varied across the Dolphin models, and that variation is the principal difference between the three models. The Dolphin 1000 used a diode – a simple semiconductor that only allows current to flow in one direction – to effectively block half of the *ac* current (because *ac* current switches direction – or polarity – once per cycle), thereby resulting in a temporary disruption of current. The Dolphin 2000 and 3000 use more complicated switching mechanisms, which apparently allow for greater control of the frequencies generated.

United States Patent Number 6,063,267 ("the '267 patent")[11] discloses a resonating device that is the basis for some of the later Dolphin models and is, in many ways, similar to all the Dolphin models. The '267 patent teaches that the capacitance of the device may "be provided by a winding capacitance of the coils or by a separate tuning capacitor." '267 Patent, col. 2 lines 15-16. The patent later discloses that "[t]he winding of the two coils L2-inner and L2-outer on top of one another, or otherwise in close association with one another, produces a winding capacitance between those two coils which forms all or part of the capacitance of a series resonant circuit." '267 Patent, col. 3 lines 48-52. These coils described in the '267 patent correspond to the concentric center coils on all Dolphin models.

Clearwater's expert explained that "the coils also develop a combination of distributed and lumped-element *capacitance* . . . . In the case of the multiple coils of the Dolphin device, the coil wires themselves serve the function of the capacitor electrodes." (Horenstein Report ¶ 28) (emphasis in original)

Finally, EVAPCO's expert, Thomas Keim, explained:

> because there are electric fields in general inside a coil, the coil has inherent or parasitic capacitance even though it wasn't built to be a capacitor . . . . the function of capacitance in my *LC* oscillator is now being served by the distribution of electric fields which existed, which exist in that coil, so the energy is still being swapped from inductor stored energy and capacitor stored every quarter cycle but it's now being done with a parasitic capacitor.

(Keim Tr. at 910-11)

The descriptions of "winding," "distributed," and "parasitic" capacitance all refer to essentially the same thing. This type of capacitance arises from a combination of two facts.

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[11] The '267 patent was issued to a Clearwater consultant, Walter Crewson, who later assigned the patent to Clearwater.

First, whenever current moves through a wire, there is voltage between any two points on the wire.[12] Second, a capacitor – or capacitance – exists whenever there is voltage across an insulator. The insulator can be anything, including the insulation surrounding a wire or even open air. These two facts taken together mean that, if any two points on the Dolphin's circuit are separated by an insulator, those two points and the insulator will function as a capacitor. In other words, not only will current flow *through the wire* between the two points, but an electric field will be generated *across the insulator* between the two points. This happens in at least two places on the Dolphin. First, as disclosed in the '267 patent, the air between the two concentric coils will work as a capacitor because the air is an insulator and there is voltage between the wires of the two coils. Second, as both experts explained, the insulation between the wire loops on any one coil will also work as a capacitor because the wire insulation is an insulator and there is voltage between any of the two wire loops.

In short, when current to the Dolphin is momentarily interrupted, the Dolphin exchanges energy between the magnetic fields of its inductors, i.e., its coils, and the electric fields of its capacitors, i.e., the wire insulation along the length of the coils or the air between the two concentric coils. The Dolphin relies on this "ringing" to expose the water flowing through it to high frequency fields.

5. *Axial Electric Fields*

As explained, there is voltage between any two points on the Dolphin's coils. Additionally, the further away any two points are on the circuit – i.e., how much wire is in

[12] This is true so long as the wire has some inherent resistance, which the wire in the Dolphin certainly does.

between them – the greater the voltage between them. Furthermore, because of the way the Dolphin's coils are wired and wrapped, loops of wire that are far apart from one another in the circuit are nevertheless physically proximate. More specifically, the wire loops that bound the two gaps between the Dolphin's coils, though physically proximate, have a relatively high voltage between them (because they are far apart on the circuit). Finally, the material in the Dolphin's gaps is either air, wire insulation, PVC pipe, or water – all of which are insulators.

The result of these attributes is that there is a relatively concentrated voltage across the non-conducting gaps between the Dolphin's coils. Consequently, there is an electric field across those gaps. The direction of that field is across the gaps. The magnitude of that field is proportional to the voltage across the gap and inversely proportional to the size of the gap. Moreover, the magnitude of the axial electric field in the gaps is greater than the magnitude of the induced electric field.

6. *Turbulence*

At some point, Clearwater asked Crewson, its consultant, whether turbulence in the water flowing through the Dolphin would affect the Dolphin's performance. Crewson made some calculations, on the basis of which he concluded that turbulence was not a factor in the Dolphin's performance. Those calculations took Crewson several hours, but most of the time was spent determining which calculations he needed to perform; it only took him a few minutes to do the actual calculating.

II. Discussion

A. Standard

Clearwater seeks a permanent injunction protecting its trade secrets.[13] This action is brought under the Connecticut Uniform Trade Secrets Act ("CUTSA").[14] Federal jurisdiction is based on diversity of citizenship.

To receive any relief under CUTSA, a plaintiff must establish the existence of a trade secret. A trade secret is defined as:

> information, including a formula, pattern compilation, program, device, method, technique, process, drawing, cost data or customer list that: (1) Derives independent economic value, actual or potential, from not being generally known to, and not being readily ascertainable by proper means by, other persons who can obtain economic value from its disclosure or use, and (2) is the subject of efforts that are reasonable under the circumstances to maintain its secrecy.

Conn. Gen. Stat. § 35-51(d).

Key to this case, a trade secret must not be generally known or readily ascertainable, through proper means, by other persons who can obtain value from it, i.e., other people in the relevant industry. "Matters of public knowledge or general knowledge in an industry cannot be appropriated by one as his secret." *Town & Country House & Homes Service, Inc. v. Evans*, 150 Conn. 314, 318 (1963). Thus, information that is well known by the public or well known in the particular industry cannot be a trade secret. For example, a well known physical law cannot be a

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[13] Clearwater claims more trade secrets than are discussed in this opinion. It does not seek injunctive relief in connection with those secrets, only damages. With the parties' consent, issues relating to those secrets are reserved for a later trial.

[14] EVAPCO argues that Maryland law, not Connecticut law, should govern. Because I do not rest my decision on any legal principle about which Maryland and Connecticut disagree, there is no need to reach the issue.

trade secret. Neither can information that is disclosed in a patent be a trade secret. *On-line Technologies, Inc. v. Bodenseewerk Perkin-Elmer GmbH*, 386 F.3d 1133, 1141 (D. Conn. 2004). Additionally, information that would be readily ascertainable by someone in the industry, i.e., ascertainable quickly and at little cost, is also not afforded trade secret protection. For example, information that is obvious upon examination of a publicly available product is not a trade secret. *Nora Beverages, Inc. v. Perrier Group of America, Inc.*, 164 F.3d 736, 750 (2d Cir. 1998). Similarly, deductions or conclusions that would be reached with little time or effort by people experienced in the general industry are not protected as trade secrets.

Nevertheless, the mere fact that some components are well known does not mean that a secret method of combining those components cannot be a trade secret. *Elm City Cheese Co. Inc. v. Federico*, 251 Conn. 59, 74 (1999) (quoting *Allen Mfg. Co. v. Loika*, 145 Conn. 509 (1958)). Similarly, a discovery that is based on public knowledge may be entitled to trade secret protection, if the information discovered is neither well known nor readily ascertainable. Moreover, the kind of novelty required in the patent context is not needed for trade secret protection. *See Link Group International v. Toymax, Inc.*, 2000 U.S. Dist. LEXIS 4567, *54 n.7 (D. Conn. 2000). Information that can only be obtained at a significant expense of time or money, even if it is obvious how to obtain that information, is entitled to trade secret protection.

Determination whether a particular piece of information is a trade secret is a question of fact. *Elm City Cheese*, 251 Conn. at 68.

B. The Claimed Trade Secrets

Clearwater has never made perfectly clear what information it seeks to protect as trade secrets. During the course of the litigation, Clearwater provided a list of twenty-one claimed secrets, some of which have multiple parts, but it is not pursuing each of those secrets in connection with its request for injunctive relief. Moreover, in oral argument Clearwater restated some of its secrets. Nevertheless, it is my understanding that at this point Clearwater is seeking trade secret protection for, at most, the following information:

1. In addition to the induced electric field, there is an "axial" or "imposed" electric field caused by the voltage differences between the coils (i.e., in the "gaps") in the Dolphin System assembly.

2. By manipulating the size of the gaps, the voltage drop across the gaps, and other aspects of the coil wiring and design, it is possible to generate electric fields that are substantially stronger than the previously known induced field.

3. The gap between coils of the Dolphin results in the creation of a radial magnetic field and an electric field induced by that radial magnetic field.

4. The axial electric field could be created by means of two conductive bands, separated by a gap and with voltage between the two bands.

5. The gap between the first coil and middle coils ("G1") on the Dolphin has less impact on the Dolphin's water treatment performance than the gap between the middle coils and the fourth coil ("G2").

6. Turbulence in the water does not significantly impact the Dolphin's water treatment performance.

7. The Dolphin can be substantially replicated using only two coils.

C. Findings on the Secrecy of the Claimed Trade Secrets

The information encompassed by each claimed secret is either generally known in the non-chemical water treatment industry or readily ascertainable through proper means by those who could benefit from the knowledge.

As a preliminary matter, I note that "those who could benefit from the knowledge," in this case, means other people in the non-chemical water treatment industry. People in that industry have some knowledge of electromagnetism, electrical engineering, and circuit design[15] and the basic principles of those fields are generally known in the non-chemical water treatment industry.

1. *In addition to the induced electric field, there is an "axial" or "imposed" electric field caused by the voltage differences between the coils (i.e., in the "gaps") in the Dolphin System assembly.*

This information is both generally known in the industry and readily ascertainable by those in the industry.

That there is an electric field in the gaps between the Dolphin's coils is publicly disclosed by the '267 patent. As explained above, every Dolphin model has employed a resonating circuit composed of an inductor and a capacitor, yet no Dolphin model has ever incorporated a capacitor in its circuit. Instead, they have all relied on the inherent or parasitic capacitance of the device itself, i.e., on an incidentally generated electric field. The specific inherent capacitance disclosed by the '267 patent is "a winding capacitance between those two coils which forms all or part of the capacitance of a series resonant circuit." '267 Patent, col. 3 lines 50-52. In other words, the

[15] I do not mean that *all* people in the industry have this knowledge. Non-technical people – salesmen, managers, accountants, etc. – also work in the industry. I only mean that anyone in the industry who is developing a non-chemical water treatment device necessarily employs people with this knowledge.

‘267 patent discloses a capacitance, i.e., an electric field, in the gap between concentric coils in the Dolphin. Of course, Clearwater is not interested in the field between concentric coils, but in the field between adjacent coils, but that does not change the essential fact that the existence of an electric field between the Dolphin’s coils is disclosed by the ‘267 patent.[16]

Even were the existence of that electric field not disclosed, it would be readily ascertainable by those in the non-chemical water treatment industry. More specifically, the fact that the Dolphin creates an electric field in the gap between its coils is something that would be apparent on examination of the device by someone familiar with the principles of electromagnetism and electrical engineering, i.e., someone in the non-chemical water treatment industry.[17] Several pieces of evidence lead me to this conclusion.

First, it is well known in the industry that any time there is voltage across non-conducting material an electric field is generated. It is also well known that in an electrical circuit made of resistive material, there is voltage between any two points in the circuit. And, it is well known that, because of these two facts, when two points on a circuit are separated by non-conducting material an electric field will exist across that non-conducting material.[18] Consequently, a person

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[16] Additionally, the ‘267 patent appears to anticipate that the gap will not necessarily be between concentric coils. “The winding of the two coils L2-inner and L2-outer on top of one another, *or otherwise in close association with one another*, produces a winding capacitance between those two coils. . . .” ‘267 Patent, col. 3 lines 48-51 (emphasis supplied).

[17] This information, as well as all the other information that I find would be apparent from examination of the Dolphin, would also be apparent from examination of a Parrot device, because, as explained above, the two devices do not differ in any material respect other than the switch used to generate high frequency fields.

[18] Not only is this fact well known, but the inventor of the Parrot appears to have intentionally used these “incidental” electric fields to provide the capacitance for the Parrot’s resonating circuits, as evidenced by the fact that the patent for the Parrot (United States Patent

in the industry who examined the Dolphin would realize that its wiring and structure would give rise to electric fields at various places in the device, including the gap between the coils. (*See* Keim Report at 25-26)

Second, Clearwater's consultant, Crewson, realized as much soon after first examining a Dolphin. In a draft memo composed in 1998, he wrote that analysis of the Dolphin would be difficult because of, among other things, "**the many stray capacitances between and inside the coils**." (Pl.'s Ex. 279) (emphasis in original)

Third, both sides' experts agreed that computer programs used by electrical engineers will, when given the structure of a particular device such as the Dolphin, display all generated electric fields, including the axial field. (Keim Report at 13, 25; Horenstein Tr. at 796-97) Crewson also agreed with this point. (Crewson Tr. at 536)

Clearwater argues that the fact that it took its consultant, Crewson, nearly six years to discover the axial electric field is evidence that the existence of that field is not "readily ascertainable." Although I do not dispute that, in general, evidence of the time spent developing a putative secret can be probative of the question whether the secret is readily ascertainable, *see Robert S. Weiss & Assoc. v. Wiederlight*, 208 Conn. 525, 538 (1988), I do not find that evidence persuasive here for two reasons. First, it is not exactly true. As just explained, Crewson was immediately aware that the Dolphin contained "stray capacitances," although he apparently did not follow up on that discovery at the time. Second, Crewson acknowledged that his failure to discover the axial field between the gaps was anomalous. "Why didn't I see it before? Well, I

No. 5,702,600) discloses a resonating device without a capacitor, i.e., a device that, for the reasons explained above, must have relied on the incidental electric fields inherent in its circuitry.

don't know." (Crewson Tr. at 448) "I had blinders on." (Crewson Tr. at 451) "And so that's, I think, that's my excuse for why I didn't see this electric field sooner, why it took me so long. I wasn't looking for it." (Crewson Tr. at 455)

2. *By manipulating the size of the gaps, the voltage drop across the gaps, and other aspects of the coil wiring and design, it is possible to generate electric fields that are substantially stronger than the previously known induced field.*

This information is generally known to people in the industry. It is a basic principle of electromagnetism that the strength of an electric field generated by voltage between two conductors separated by an insulator is proportional to the voltage between the conductors and inversely proportional to the distance between the conductors. Consequently, anyone with even a passing knowledge of electromagnetism would know that an electric field, like the one in the Dolphin, could be strengthened by altering either the gap between the conductors or the voltage applied across the conductors.[19]

Although it does not say so explicitly, it is possible that Clearwater means to claim as a trade secret the fact that the axial electric field in the current Dolphin is stronger than any induced electric field. That fact, however, is readily ascertainable. First, Crewson testified that it was a fairly simple matter for him to measure the axial electric field. (Crewson Tr. at 515-16) Second, available computer programs are able to quickly give the relative field strengths of the fields the Dolphin generates. (Keim Report at 13, 25; Horenstein Tr. at 796-97; Crewson Tr. at

[19] I am not sure what Clearwater means when it says that this electric field could be strengthened by manipulating "other aspects of the coil wiring and design." Save to the extent manipulation of the coils' wiring affects the voltage between coils, i.e., indirectly manipulates "the voltage drop across the gaps," there is no indication of how such manipulation would affect the strength of the electric field.

536)

It is also possible that Clearwater is claiming that the axial electric field's effectiveness in water treatment is a secret. This claim does not qualify as a trade secret because it does not really qualify as information. Clearwater has not done any tests that establish directly that the axial electric field is effective in water treatment. Rather, Clearwater (a) believes that electric fields are what matter in water treatment, and (b) knows that the axial electric field is the strongest electric field in the Dolphin. The first piece of information is undisputably public; it is on Clearwater's website. *See http://www.clearwater-dolphin.com/operating_principles.htm*. The second piece of information, for the reasons just given, is readily ascertainable. In other words, any claim that the axial field is effective in water treatment essentially reduces to the information that the axial field is the strongest electric field, information that is readily ascertainable.[20]

3. *The gap between coils of the Dolphin results in the creation of a radial magnetic field and an electric field induced by that radial magnetic field.*

The existence of a radial magnetic field in the Dolphin is readily ascertainable.

It is well known that a solenoid generates a solenoidal magnetic field, which, at the point it exits the solenoid, has both a radial and axial component. It is also well known that when two magnetic fields overlap, the magnitude of the resulting field at any one point is the combined magnitude of the overlapping fields.

It would be apparent from examination of the Dolphin that each of its coils is a solenoid and therefore generates a solenoidal magnetic field. It is also apparent from examination of the

[20] I note that Clearwater would have a much stronger claim if, for example, it claimed that the specific voltage or gap width needed for effective water treatment was its trade secret. Clearwater, however, does not know, or claim to know, that information.

Dolphin that in the gap between the coils there is an overlapping magnetic field. It would, therefore, take a person in the industry little time to determine that, when the relevant coils generated opposing magnetic fields, that gap would have a strengthened radial component and a weakened axial component.

Aside from the fact that the information concerning the Dolphin's radial magnetic field is clear from the elementary physical principles involved in its generation, there are several pieces of evidence that independently confirm my finding.

First, the inventors of the Parrot explicitly took advantage of this strengthened radial field, using it to power a small LED signal light on their device. (Horenstein Tr. at 809-10) Second, available computer programs would indicate the existence of the radial field. (Keim Report at 13, 25; Horenstein Tr. at 796-97; Crewson Tr. at 536) Third, even Clearwater's own expert testified that the existence of this field is well known. (Horenstein Tr. at 808)

The existence of an electric field induced by the radial magnetic field is also readily ascertainable.

It is well known that a fluctuating magnetic field gives rise to an induced electric field. As just explained, it would be readily apparent to a person in the industry that the Dolphin generated a radial magnetic field in the gap between opposing coils. It would also be readily apparent that the field fluctuates, because it is generated by *ac* current. Consequently, it would be apparent to any person with a basic knowledge of electromagnetism that there was an induced electric field in the gaps between the Dolphin's coils.

4. *The axial electric field could be created by means of two conductive bands, separated by a gap and with voltage between the two bands.*

It is well known that an electric field can be generated by means of two conductors, with voltage between them, separated by an insulator. Because Clearwater's proposed method of field generation via copper bands is nothing more than a restatement of that generally known principle, it too is generally known in the industry.

5. *The gap between the first coil and middle coils ("G1") on the Dolphin has less impact on the Dolphin's water treatment performance than the gap between the middle coils and the fourth coil ("G2").*

This secret actually encompasses two pieces of information: (a) the radial magnetic field at the second gap is stronger than at the first, and (b) the axial electric field at the second gap is stronger than at the first. Both facts are readily ascertainable from the structure of the Dolphin.

It is apparent that the second gap would have a stronger radial magnetic field because that is the gap between opposing coils. Similarly, because of the way the Dolphin is wired (something that is easily determined from simple observation of the device) it is readily ascertainable that the voltage across the second gap is higher than across the first. Consequently, it is obvious that the field across that gap (given that both gaps are approximately the same width) would be stronger.

Moreover, the strength of both fields in both gaps could be quickly measured directly or with a computer program. Consequently, even were relative strengths of the fields in the gaps not obvious from observation of the structure of the device, they could be readily ascertained by direct measurement or simple computer analysis.

The significance of either fact to water treatment is not a secret for the reason already

discussed: all Clearwater knows about effectiveness in water treatment is the result of the application of its publicly disclosed belief that electric fields are significant in water treatment. In other words, Clearwater has no direct knowledge that a particular gap is more significant to water treatment, it merely knows that one gap generates a stronger electric field, a fact that, as just explained, is readily ascertainable.

6. *Turbulence in the water does not significantly impact the Dolphin's water treatment performance.*

All Clearwater's information regarding this claimed secret was gathered by Crewson – who is not an expert in fluid dynamics – in, at most, a matter of hours. (Crewson Tr. at 499) It would, according to Crewson, be available to someone trained in fluid dynamics in a matter of minutes. *Id.* It is, consequently, readily ascertainable.[21]

7. *The Dolphin can be substantially replicated using only two coils.*

There is some ambiguity to this claimed trade secret because it is unclear what Clearwater would consider a "replication" of the Dolphin. If what Clearwater means is that the fields discussed in this opinion – and at trial – could be generated with only two coils, that is readily ascertainable because not a single one of the fields discussed relies on the presence of more than two coils.

If, on the other hand, what Clearwater means is that the Dolphin's water treatment effectiveness could be replicated by a two-coil device, there is no evidence that is true. As a

[21] The secret concerning turbulence is one of Clearwater's so-called "dead-end" secrets, i.e., the allegedly valuable information is the knowledge that a certain research path will *not* be fruitful. Because I find that the claimed "dead-end" information is readily ascertainable, I do not need to reach the question whether Connecticut affords trade secret protection to that type of negative information.

theoretical matter, no one knows exactly why the Dolphin works, and therefore, no one knows whether such a two-coil device would be effective. As an empirical matter, no one has ever tested the effectiveness of a two-coil Dolphin.

D. Validity of the Claimed Trade Secrets

In sum, I find, as a matter of fact, that all of the claimed secrets regarding the physical properties of the Dolphin are either generally known or readily ascertainable by proper means. I also find that any claimed secrets regarding the Dolphin's effectiveness in water treatment are not "information," because they are nothing more than the application to the Dolphin's physical properties of Clearwater's unproven and publicly held belief regarding the efficacy of electric fields.

Moreover, this is not a case like *Elm City Cheese*, where a combination of publicly known pieces of information nevertheless constitutes a trade secret. In that case the Connecticut Supreme Court held that a method for making cheese was properly deemed a trade secret when that method was secret even though the components that made it up were not secret. *Elm City Cheese*, 251 Conn. at 75. Similarly in *Allen Mfg. Co. v. Loika*, the Court likened such a process to a cooking "recipe" where, although all the ingredients are publically available, the method and proportion of their combination can be a valuable secret. *Allen Mfg. Co.*, 145 Conn. at 515. Here, by contrast, Clearwater does not claim that the method of assembling the Dolphin is a secret. Neither does it claim that the way various components are arranged in the Dolphin is a secret. It argues that the properties of its final product are a secret. But, for the reasons given above, I find that those properties are actually readily ascertainable by examination of the Dolphin. In other words, Clearwater is more like a cheese manufacturer who claims that the

texture or taste of its cheese is a secret, than it is like a manufacturer who claims the method for making its cheese is a secret.

Accordingly, I conclude, as a matter of law, that none of Clearwater's claimed trade secrets meet the statutory definition of "trade secret" under CUTSA. Because none of the claimed secrets qualify as "trade secrets," I do not need to decide whether Clearwater took adequate steps to protect the secrecy of its information or whether EVAPCO or John Lane misappropriated, or threatened to misappropriate, that information.[22]

III. Conclusion

Clearwater's request for permanent injunctive relief is DENIED.

It is so ordered.

Dated at Bridgeport, Connecticut, this 26th day of July 2005.

/s/ Stefan R. Underhill
Stefan R. Underhill
United States District Judge

[22] I acknowledge the point made by Clearwater that a defendant who obtains a secret by improper means is not excused merely because the secret could have been discovered by proper means. *See, e.g.*, *Sperry Rand Corp. v. Rothlein*, 241 F. Supp. 549, 562 (D. Conn. 1965); *Telerate Systems, Inc. v. Caro*, 689 F. Supp. 221, 232-33 (S.D.N.Y. 1988). But for that rule to apply, the information must actually be a trade secret, i.e., it must, among other things, not be "readily ascertainable." In this case, I do not hold that the defendants are excused because they could have ascertained the secret information properly; I hold that the information itself is not secret because it is readily ascertainable. In other words, secret information does not lose the law's protection merely because someone else may discover it, but, if someone else could *readily ascertain* that information, then the information is not secret in the first place. *See also Transam Inc. v. Zhawred*, 1990 WL 284015, *4 (Conn. Super. May 29, 1990) ("the language of [CUTSA] does not require that the defendant actually rely on innocent sources to discover the potential trade secret, but only that the contested information be 'readily ascertainable by proper means.'").

Appendix A

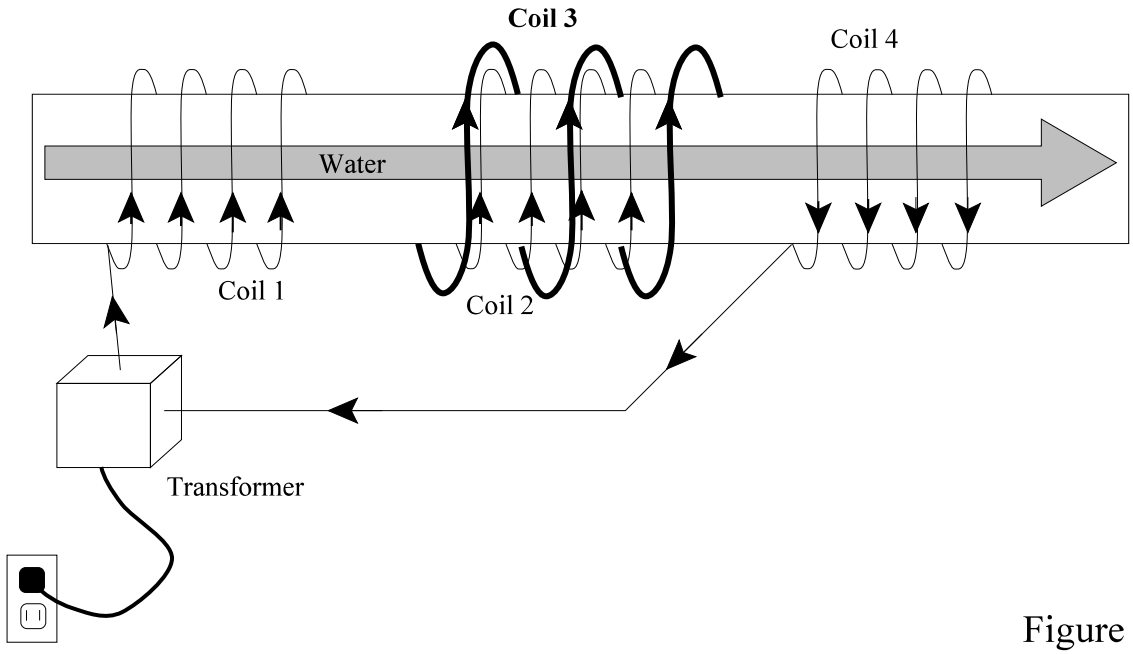

Figure 1

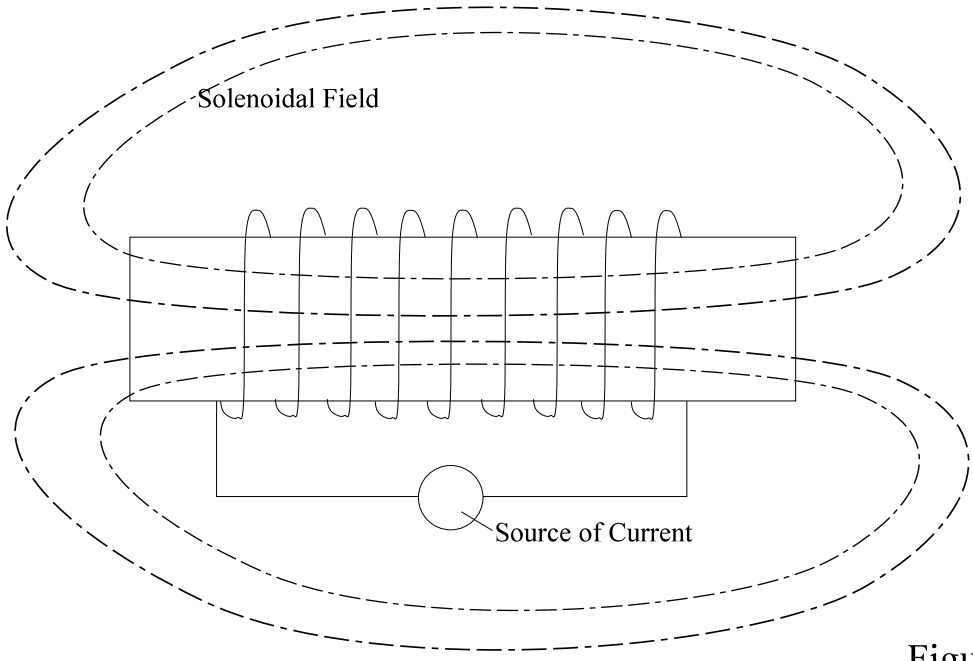

Figure 2

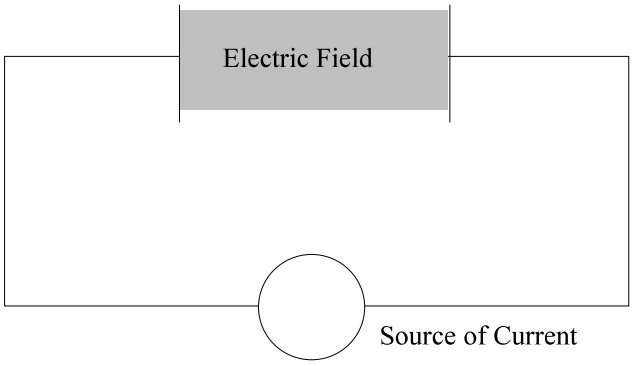

Figure 3