

STATE OF CONNECTICUT

PUBLIC HEARING ON PROPOSED REGULATIONS CONCERNING WELL DRILLING

DATE: APRIL 22, 2008

BEFORE: ELISA NAHAS, HEARING OFFICER

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LEGAL DIVISION
CONSUMER PROTECTION

NAHAS: Good morning. My name is Elisa Nahas, attorney with the Department of Consumer Protection, and I've been designated by Commissioner Jerry Farrell, Jr., to be the Hearing Officer for this morning's Public Hearing on Proposed Regulations concerning well drilling, Section 25-128-33 through 34. Today is April 22, 2008 and the time is approximately 11:20 in the morning. We are in Room 119 of the State Office Building at 165 Capitol Avenue, Hartford, Connecticut. On March 18, 2008, the Department of Consumer Protection published in the Connecticut Law Journal, a Notice of Intent to Amend Regulations and text of proposed regulations concerning well drilling. These regulations are being proposed in accordance with the authority granted in Connecticut General Statutes Section 4-168 and 25-128(b)(1). For the record, a copy of the March 18, 2008, Connecticut Law Journal Notice will be entered as Exhibit A. A copy of the agency's Fiscal Note, which reflects no fiscal impact to result from these regulations being amended, will be made part of the record as Exhibit B. And, Commissioner Jerry Farrell Jr.'s letter, designating me as the Hearing Officer for this morning's hearing, will be entered in the record as Exhibit C. We have received some submissions to date. We have a submission from Earth Linked Technologies from Hal Roberts, CEO, Lakeland, Florida, dated April 16, 2008, addressed to Commissioner Jerry Farrell, Jr. That submission will be entered and marked as Exhibit D. We have received a submission dated April 16, 2008, from Adams & Reiss, LLP, by Attorney Brad Lampley. That submission will be entered and marked as Exhibit E. And, we have also received a submission from Energy Independence Now from Derek Shapiro, addressed to Commissioner Farrell, dated April 22, 2008. That submission will be

entered and marked as Exhibit F. If anyone has any other documents or submissions that they would like to present, you may do so when you speak or after you speak, and we will have those marked as exhibits as well. We have notified the Department of Economic and Community Development of our intent to amend these regulations. Pursuant to Connecticut General Statutes 4-168a, when drafting proposed regulations, the Department is to consider methods that would accomplish the objectives of the applicable statutes while minimizing the adverse impact on small businesses. This agency has specifically considered the five methods listed in Section 4-168a(b) of the Connecticut General Statutes, and has determined that the amendments being proposed will have no impact on small businesses in Connecticut. At this point, we will begin by having the individuals who have signed the speaker signup sheet give their comments. The first person to speak will be Richard Hurlburt from the Department of Consumer Protection.

HURLBURT: My name is Richard Hurlburt. I'm the Director of Occupational and Professional Licensing. In regards to these proposed regulation changes, the Department did work in collaboration with the Department of Public Health, the Department of Environmental Protection, and industry members to come-up with these proposed changes. I would like to thank everybody today for any input you could give us in regards to the proposed changes so that the Department can further consider such input. Thank you.

NAHAS: Thank you. The next speaker will be Jeff Curran, Department of Public Health.

CURRAN: My name is Jeffrey Curran. I am a Public Health Services Manager at the Department of Public Health. The Department of Public Health has testimony in support of the proposed changes to the well drilling code. Currently, the installation of geothermal heat exchange systems is largely unregulated in Connecticut. Geothermal heat exchange systems can provide an alternate means to lower one's energy costs in this time of spiraling crisis. However, improper installations of such systems can lead to contamination of Connecticut's ground water resources. Regulation of this industry, therefore, is needed to ensure protection of one of our most precious resources. Section 34 of Special Act 06-6 requires the Department of Public Health, in consultation with the Departments of Consumer Protection and Environmental Protection, to review and make recommendations regarding bore holes to be used for the development of closed-loop geothermal heat pumps or similar systems; and, specifically, the abandonment, construction of, and appropriate separating distances between such bore holes. The three agencies convened a work group to study the issues and report to the legislature. The work group consulted with industry stake-holders to develop regulations that are reasonable for industry compliance, protective of the environment, and protective of the public health. These proposed regulations are the result of the work group's efforts. The DPH has researched and reviewed these proposed regulations, and firmly believes that: (1) the specific construction standards and the licensure requirements for individuals installing such systems helps to safeguard the consumer from substandard work practices; (2) limiting the types of materials used for heat transfer fluids and grouts to either (INAUDIBLE) or NSF-approved materials is

protective of the environment and public health; (3) the proposed separation distances coupled with the construction standards and allowed heat transfer fluids and grouts, proposed loop geothermal systems are protective of the public health. The Department of Public Health strongly supports adoption of these proposed regulations. I have copies of the testimony.

NAHAS: Thank you very much. The testimony of Mr. Curran will be entered and marked as Exhibit G. The next speaker is B. Ryland Wiggs, CEO, Earth To Air Systems from Tennessee.

WIGGS: Thank you very much. I appreciate, very much, the opportunity to come here today and discuss this very important issue. Very briefly, my name is B. Ryland Wiggs. I'm the CEO of Earth To Air Systems from Franklin, Tennessee. Our Counsel is Adams and Reiss, and Adams and Reiss, I understand, has timely submitted an exhibit for your consideration, which has been marked as Exhibit E. I simply want to confirm that the letter dated April 16, 2008 from Adams and Reiss, marked as Exhibit E, was prepared in consultation with Earth To Air Systems. We have reviewed this. I agree with its content and, to the best of my knowledge of the information, I believe the content of the letter is accurate. We would respectfully submit the Commissioner's consideration of the material contained thereof. Thank you.

NAHAS: Thank you very much. The next person is Hal Roberts, Earth Linked Technologies, Lakeland, Florida. I know it's kind of a hassle, but if you don't mind, whoever the speaker is, should come over here so that it can all be picked-up on the recorder.

ROBERTS: I'm Hal Roberts, CEO of Earth Linked Technologies, formerly known as ECR Technologies. ECR was our former name. Our current name is Earth Linked Technologies. We are located in Lakeland, Florida. I'm the CEO of the company. We have 28 years of experience with direct geo-exchange heat pumps for both space heating and cooling, and water heating. We have a product that is saving energy in 41 states and 14 countries. The product is safety and performance tested by the Air Conditioning, Heating, and Refrigeration Institute. Eighteen months ago, the US EPA verified 75-percent electricity savings in commercial water heating as compared to electric resistance water heating. That unit can save 42,000 pounds of carbon emissions annually. Today is Earth Day. Our product has been featured on Earth Day on the mall over in Washington, DC. We deliver renewable solar energy from the shallow earth. We use a 3 to 4 inch diameter hole. The maximum length is 100 feet. Typically, the depth is between 35 and 70 feet because we can install diagonally. Therefore, we displace approximately 11 percent of the volume of a typical water source geothermal heat pump. Disturbing less earth improves heat exchange in the earth. My letter to Commissioner Farrell detailed information about copper in the ground, our cathodic protection system, environmental reports, and MSDS reports on both refrigerant and oil, and an environmental study that was done several years ago for the State of Florida, which is extremely protective of ground water because that's our only source of water in the peninsula of Florida. EPA has determined that Connecticut is a non-attainment area for air quality standards. You have, in Connecticut, as of the first day of this year, reported by US DOE, the highest electric rates on average of any state

in the country. So, just as everywhere, people in Connecticut need to save energy and reduce the impact on their environment. We all need to avail ourselves of every clean energy technology. We support reasonable regulations to protect ground water. However, the Connecticut legislature has only delegated authority to the Commissioner to regulate water wells; not closed-loop heat pump bore holes. Nor, is it reasonable to require the use of well drillers who use large machines for 6 to 8 inch diameter holes – they are accustomed to drilling deep to connect the ground water. We do not need to come into contact with ground water. Well drillers use large amounts of energy to displace large amounts of earth, which reduces the potential for heat exchange for our kind of system. They maintain open connections to ground water. They are trained to install pumps to extract ground water. And therefore, they drill at high cost as compared to the drilling that is used in 40 other states for this kind of equipment, which drives high-efficiency small-bore heat pumps from Connecticut. And, the rigs that well drillers have to use are too large to access most residential retrofit projects, which are a large number of customers for this kind of system. Our mission is to reduce consumption of energy (especially the firing of fossil fuels) and to reduce the impact on heating and cooling. The Department's mission is to ensure fair and equitable marketplace, and safe products and services. I believe that these missions are consistent, compatible, and I respectfully suggest that the proposed regulations be tabled until there is delegation of legislative authority to the Commissioner and that they be rewritten to separate water wells from closed loop heat pumps and be limited to what is necessary to protect ground water. Thank you.

NAHAS: Thank you very much. The next person is Scott Tiefenthaler. Earth Linked Technologies.

TIEFENTHALER: My name is Scott Tiefenthaler. I live in Fairfield, Connecticut. I'm a mechanical engineer and a small business person. I recently installed an Earth Linked Technologies heat pump in my own home. This resulted in a 60-percent reduction in the heating costs. The installation was straightforward. I believe it to be of very well engineered technology. There was a comment made earlier about the proposed regulations having no effect on small business. I do believe that the current draft of the regulations has been specifically engineered to provide a virtual monopoly on geothermal installations by the water well drillers. The water well drillers fully realize that DX technology does not require their services. By excluding DX technology, I think it would be a disservice to the consumers in this state. There are thousands of DX installations throughout the country and in other countries in the world. To our knowledge, there has not been one detrimental effect to the environment from any of these installations. I know it's impossible to prove a negative, but if they're going to look at a technology and draft regulations that will regulate it, it would behoove the state to look at the track record of such technology. By inadvertently excluding this technology and not allowing the consumers in Connecticut to have access to it, it will be detrimental to the environment and detrimental to the State's long-term goal of reducing greenhouse gas emissions. Thank you.

NAHAS: Thank you. Joe Parsons. Earth Linked Technologies.

PARSONS: Good morning. I'm Joe Parsons, Vice President of Earth Linked Technologies, Lakeland, Florida. I'd just like to echo some of the statements that have already been made. This is certainly a technology with many positive environmental efficiency benefits. And, as Scott said, and I've spent many years in this industry - I am not aware of any installation that has had a negative environmental impact. And, that's based on our installation of 3,000+ systems and I'm sure the industry, itself, has experienced more than 10,000 installations of direct exchange systems over the years. We have installed systems that are operational today that have been in the ground for some 20 years; systems in Florida; systems in Michigan. And, I recently heard of one system of another manufacturer that's been installed some 34 years in Kansas City. One of our technicians was called to do some routine maintenance on a 34-year-old system in Kansas City. I think there are great benefits to the retrofit market. Our technology is uniquely suited to small bore-drilling technology. And, that opens many doors for consumers who can certainly need the environmental and efficiency benefits of our product. When I say environmental, I'm talking about the carbon footprint reduction based on the reduction in electric consumption or the elimination of fossil fuel firing. Thank you.

NAHAS: Thank you. Mel Hensch.

HENSCH: Good morning. My name is Mel Hensch. I'm the area representative for Earth Linked Technologies and an energy efficiency consultant for the past 20 years. I'm a taxpayer and property owner in Connecticut for the past 30 years. I've never seen a set of regulations so designed to put a halt to small business in my life. Virtually

speaking, every bore-hole driller that has been working in this state for the past 20 years has to stop. They can no longer drill 3-inch bore holes without going through the various antics required by this draft proposal. I'm referring specifically to the persons who are currently licensed by other agencies in this state that routinely drill 3-inch bore holes in the performance of drilling and blasting duties, anchor installations, and all sorts of other similar operations. We're currently in an energy crisis, unprecedented, and getting worse by the month. I filled-up my tank on the way to this hearing for \$3.75 a gallon. Any system that goes-in can save 400 to 800 gallons of fuel oil. Any kind of a delay is, in my view, unwarranted. I note the draft regulations give blanket approval for black polypropylene piping, but not copper. This is the copper valley of Connecticut. We've been using copper piping in the ground and in refrigeration systems since before I was born. So, it seems silly to involve two or three state agencies deciding whether or not copper piping is appropriate for use in the ground when you'll find the city full of it. So, it's a little hard for me to believe that it poses some environmental issue. The EPA is on-record a number of times indicating that copper piping in the ground and in refrigerants (INAUDIBLE) pose no hazard whatsoever and is extremely energy efficient. I think this is a time in our country's future when we have to act quickly to implement any energy efficient measure we can think of that is safe and has been proven safe. And, I see no evidence to the contrary. And, I've seen absolutely nothing that will save as much energy as any kind of a geothermal heating and cooling system. I just think it's something that we need to move ahead, with due caution, but bearing in mind that putting a whole list of small businessmen out of business because they don't fit that

modal is certainly not appropriate. I'd like to thank you for your time this morning. I look forward to receiving a copy of the hearing.

NAHAS: Thank you very much. Mr. Ronald Hickey.

HICKEY: Good morning everyone. My name is Ron Hickey. I'm with Thomas Drilling and Blasting. I'm the Vice President of the company. We're a drilling and blasting contractor who has been involved in projects all over Connecticut, New York, Massachusetts, Maine, New Hampshire, Vermont, and also Rhode Island. In our business, we commonly drill 3-inch diameter bore holes for blasting, rock anchors, and geothermal extraction holes. We've blasted a hundred in the old state house so that they could put a basement under the state house. That's my most famous project right here in Hartford. Our drills are very environmentally efficient. They are low in fuel usage. They can drill 3-inch bore holes at any angle from vertical to one-on-one 45-degrees, and even steeper if we wanted it. They actually will turn and drill, a mitered angle. So, I can drill on a miter and I can drill on a bevel at the same time. And, they're good for getting into small, limited access space; maybe like somebody's backyard or you might not have room between the garage and the home to get a large drill in. The smaller drills will go in. They're not very obtrusive to the area and to the existing soils. I just think that, if this were enacted, I'd lose a major portion of my business. Being a small businessman, it would affect the way we do business. And, it would limit more of what I can do. Thank you very much.

NAHAS: Thank you. Rob Feuer.

FEUER: Good morning everybody. My name is Rob Feuer. I run a company called Smart Energy in New Rochelle, New York. In Connecticut, we are called Geothermal Works. And, we're concerned after reading the proposal – and I'd just like to read the following: Geothermal heating and cooling is the best way to lower any homeowner's carbon footprints. All of the DX geothermal installers, drillers, and manufacturers here today desire to emphasize how great we believe this technology is, regardless of bore-hole size, well, or bore-hole depth and regardless of what liquid refrigerant or antifreeze solution is used throughout any given system. We view DX as the Chevy or Dodge which followed Ford. Limiting competition and consumer choice is not a positive step for the State of Connecticut. Although the two technologies – water-based ground source heat pumps and refrigerant-based direct exchange systems (DX) – are both geothermal systems, there are many functional and implementation differences. For example, drilling depths are different. The size of the bore holes are different. The liquid medium for heat transfer is different. Grouting needs and methods vary. The use of heat exchangers is not the same. And, the number of pumps per system is different. It appears that there are several parts of the document that attempt to blend these two types of geothermal installations into one set of standards. This is very difficult, since they are both installed in very different fashions. This would be the same as trying to blend the regulations for both horse-drawn and gas-powered cars in the late 1800's since both were used for transportation. Water glycol and plastic pipes should not be the only allowed underground heat transfer material. Back-filling grouting methods should be installation-specific and not blended together by requiring DX

installers to use bentonite grout and other non-sand-only mixtures. The bore hole drilling licensing process should follow the same regulations as excavation; not well drilling. The current requirements are both onerous and detrimental to the State's ability to service all of those who desire geothermal system installations. If the document in question is approved in its current form, these regulations will greatly reduce competition in the geothermal market, significantly increase the installation costs of geothermal systems to Connecticut consumers, and ultimately serve to decrease statewide energy efficiency. I request modifications to the draft regulations. Specifically, it is hereby requested that the following modifications be made to the draft regulations presented in order as presented in the draft regulations: Section 25-128-39a – geo-exchange bore holes. No minimum bore hole size. 4-inches. Section 25-128-39b – closed loop geo-exchange system fluid. No limitation on using transfer fluids other than water-based heat transfer fluids. Section 25-128-39c – closed loop geo-exchange system piping – copper pipe; which has been the material of choice for underground water piping and refrigeration applications for many decades. It is a stable, naturally-occurring material, perfectly suited for use as DX geothermal material. In addition, paragraph c – modify (INAUDIBLE).

(LONG PERIOD OF INAUDIBLE RECORDING)

A VOICE: Addresses the maintenance and repair of wells and geothermal bore holes. Again, and I quote, it states, all maintenance, repair, hydrofracing, developing, and replacement of work shall be done only by a registered well driller or licensed plumber or electrician acting within the scope of a person's license as provided by

Section 25-129 of the General Statutes Articles 5 and 6 of the Regulation. Again, drilling contractors should be allowed to go in and repair 3-inch diameter holes. Section 25-128-68d, states contractors limited geo-exchange bore hole drilling – W7. Again, this is entirely about well drilling. Geothermal drilling has nothing to do with well drilling. And again, I quote, installation, repair, and maintenance of pumps, pump motors, pump piping, valves, wiring, electrical, and tanks. We're not looking to repair this. We're not well drillers. We're geothermal bore hole drillers. Section 25-128-60d and 60e addresses drillers and apprentice drillers. Included in this language in these documents would exclude most or all of the competent and qualified drilling companies. We can work together with the well drillers, but we can also work separately with them. And, I correlate that in the construction field. You can operate a dozer. You can operate a backhoe. You can operate a pay loader. You need a license to operate a crane. The crane operator gets along well with all of the rest of the union operators; non-licensed union operators. In the construction field, as they learn to operate their equipment, so do the drillers. It's a hands-on taught. Sometimes, (as in the Thomas Company), from generation to generation, it's handed down. It's a trade that shouldn't be lost. I would also like to submit pictures just to give you an idea or give the Commissioner apples and oranges; typical well drilling rig, a system setup. A lot of times it will take two vehicles. It's very cumbersome. And, I think as Rob stated, a lot of times we're drilling at the rear of a house. On this particular picture, the road is through the woods. We move our little rig through the woods to accomplish that.

NAHAS: Are those photographs the same as what's attached to the back?

A VOICE: Yes they are. These are the originals. Just to give the Commissioner – a picture is worth a thousand words. So, in conclusion, I think the proposed regulations, as written, will give the well drillers a monopoly and will prohibit many qualified companies and Connecticut residents from being employed in this field. Geothermal heating and cooling systems are the way of the future and I'd like to continue to be a very significant, although small, part of this process in extending this alternative energy source to the people of Connecticut and beyond.

NAHAS: Thank you. And, we'll take those seven photographs and we'll include those as part of Exhibit (INAUDIBLE).

A VOICE: There are eight of them.

NAHAS: Oh. Okay. Eight photographs; original photographs. Thank you. The next speaker is Charlie Wynosky.

WYNOSKY: My name is Charlie Wynosky. I'm a field manager for Advanced Geothermal. I'd like to basically read over a letter that I drafted-up and explain a little bit about the field installation process just to give a different insight as to what goes on in the field and how we install DX geothermal. I'd like to submit a letter.

NAHAS: The letter from Mr. Wynosky dated April 22, 2008, to the Commissioner.

WYNOSKY: And also some Power Point pictures and an attachment that summarizes the Power Point presentation.

NAHAS: Thank you, that will be entered and marked as Exhibit Q.

WYNOSKY: I'm basically going to say that I'd like to submit this summary as part of a Power Point presentation on a field installation process that we use at Advanced Geothermal Technology. I'm a field manager and I take great pride in our installation process. We have had our drilling equipment and trained people since 1990. We have drilled in many states; including Connecticut. We are very stringent in quality control procedures to ensure that our systems are installed safely, properly, cost effectively, and in accordance with all environmental regulations. Our employees are in a continued value-added educational process that prepares our company's staff with advanced technical training to ensure that our system is second-to-none. This presentation is for informative purposes to show the installation, installing direct exchange (DX) geothermal systems. It is specialized and unique. A well driller mechanic or plumber is not a qualified DX system installer. It requires specialized training and knowledge. The following attachment is a summary to coincide with the Power Point presentation. I hope that the presentation will indicate the need to have – if there are any regulations drafted with the help of the DX geothermal industry and that each type of system should have its own applicable regulations. Thank you for your time and I'll just summarize the process that we go through. After we get an order, we contact in Connecticut – every state its own one-call process. But, in Connecticut, it's Call Before You Dig. And basically, the service goes out to all of the utilities and it requests them to mark their utilities before you go in to drill or excavate. Then, after that is completed, we then contact all of the state agencies and local municipalities and departments to see if there is any required additional permit. After we get all of the

permits, we go to the property. We review the site and make sure that all of the utilities are marked and that there aren't any additional utilities that the property owner put-in in addition to the public utilities. When we do this, we also fill out a location form. The location form basically maps out all of the utilities and where we intend to drill. We continue on with the location form after-the-fact and mark all of the drillings and any special things that we've located. We do all of this and then we start the drilling process. After we drill each hole, we install the copper earth taps and we also then – while we're drilling and installing the taps, we also do a detailed drilling log. The log will tell us where, if we hit any water, where the overburden is, the type of overburden, whether it's sand, clay, rocks, anything that we encounter. So, we do keep a detailed log. When the drilling is complete, we then dig a trench from the house. It's 36-inches deep. It's normally about 15-inches wide. And, we dig this trench out to our pit area. In the pit area, is where we make all of our connections with the earth taps and manifolds. The trench that goes to the house really are line sets in-place and we brace everything as we make all of the connections. We go through a quality control process that, when we do the brazing, we make sure that we have no leaks. We do a pressure test quality control, and that's very minimal (an hour and a half of testing on that). We also install on our system, a magnesium anode. This anode is in place for cathodic protection. When we're completed with the manifolds and all, we drought the holes and we encapsulate everything in a fine masonry sand, and we do this, naturally, to protect any of the piping. We also flag with a caution tape above the sand to alert anybody excavating in the area in the future. Again, what we use for the line sets and the earth

taps is copper. So, that's detectable with metal detectors. We also then make a detailed print and we give it to the property owner. We do have it in our file, detailing the location of our construction that we did on-site. After we do that, we backfill and grade everything. The very last thing that we do at that point is – and this could be a few hours later – we go back and we double check our pressure gauges to make sure that we did maintain 450 PSI of pressure testing for the system. That was just a brief overview. Again, there's a Power Point presentation with pictures that will detail what the process is. Thank you.

NAHAS: Thank you very much. Darek Shapiro.

SHAPIRO: Good morning everyone. My name is Darek Shapiro. And, for the record, I'm speaking on the new regulations being drafted by the State of Connecticut, Department of Consumer Protection, concerning well drilling geothermal installations. I'm an architect; a certified building, biology, environmental consultant; and owner of Energy Independence Now, LLC. I've been designing and integrating passive and active energy systems into buildings for over 26 years. My observation of what's going on is that, when monopolies stifle competition, consumers lose. Great ideas have transformed the way we heat and cool our homes and buildings from the Franklin stove to the Sterling engine. Now, we have the first generation of geothermal systems that have been using slow conducting plastic pipe filled with a mixture of water and glycol; are facing competition from fast conducting copper pipe and eco-safe refrigerants, called the direct exchange system. The efficiencies gained from this innovation appears to be a threat to the first generation designers because, instead of going back to the lab

to improve and invent, they have tried to stifle and slander the new technology. This time, not only the consumers lose, but the energy independents of our country and even the planet loses to cheaper and more carbon-intensive fossil fuel systems. The first generation geothermal proponents want an example of how they can use the large bore drilling equipment investment that they have made. Take a look at one direct exchange company called to Earth To Air Systems that took the same six-inch bore hole and, instead of putting the same old plastic and water circulating system in there, used copper R410A high-efficiency eco-safe refrigerant and then they filled the hole with a high conductive grout. This has almost doubled their system's efficiency over the first generation method. Where there is competition for innovative products and creative marketing, consumers will learn why geothermal can save them money while reducing their carbon footprint. The participants in the industry must contribute to and adopt fairly crafted legislation to safeguard ground water. This can be easily accomplished by grouting the top of the bore holes. It is important for the entire industry to build consumer confidence. This will contribute to consumers seeking a viable competitive market that they can trust to deliver on their hope for energy independence now. Respectfully yours, Darek Shapiro.

NAHAS: Thank you. Ray Jarema.

JAREMA: Good afternoon. My name is Ray Jarema. I'm here today representing myself, a civil engineer with a master's in environmental and sanitary engineering, and a professional engineering license in Connecticut. I have academic credits towards my PhD, but have never completed the dissertation. On Governor

Grasso's behalf, I served on the Well Drilling Board for nine years, and six years as its Chairman. I have 35+ years at the Drinking Water and Health Arena. Although I've participated in the revision of the well drilling code regulations through my agency, in my opinion, I feel that the regulations dealing with separating distances, namely geothermal bore holes and public wells, still offers windows of vulnerability; a phrase claimed by Senator (INAUDIBLE) at a recent EPA Hearing. As mentioned earlier, today is Earth Day, a rather auspicious day in which to have a hearing on well drilling code regulations dealing with geothermal wells. Heating and cooling is important, but drinking water is more precious to each and every one of us. Therefore, I caution DCP not to be too liberal, but to be somewhat conservative on separation distances; namely private wells and the portion dealing with private wells under ten gallons per minute. I'm suggesting a 50-foot separation distance; not the 25. Originally, it was 75-feet. For private wells with 10 GMP (gallons per minute), 75-feet – not the 50-feet. That was originally 150-feet. Public wells for less than ten gallons per minute – 75-feet; not the 25-feet that's proposed. And, for public wells between 10 and 50 GPM, 150-feet; not the 50-feet that's proposed. Protective radiuses are key to source water protection. I feel that DCP, in general, has done an admiral job in modifying these regulations and has been most sensitive to the concerns of the well drilling industry. Therefore, I hope you will consider my modifications and I appreciate the opportunity for comments. Thank you. I also have a written submission.

NAHAS: Thank you very much. Mr. Jarema's April 22, 2008 letter to Commissioner Farrell will be entered and marked as Exhibit R. Andrew Kireta, Jr.

KIRETA: Thank you. Good afternoon. My name is Andy Kireta, Jr., Vice President with Copper Development Association. We're the market development research education and engineering arm of the United States Copper Brass and Bronze Industry. We're also associated with the International Copper Industry representing the Copper Bronze and Brass interests throughout the world. I'm here this morning. There has been a lot of anecdotal negatives assumed on the use of copper in these types of systems. I would, first off, like to appreciate the Department of Environmental Protection's due diligence in the protection of public water systems. I choose not to believe that the current regulation is written, intending to restrict the use of a material that has long been used in the State of Connecticut for the deliverance of potable water. I think there is appropriate due diligence in looking at the systems that they have before them and many of the speakers here before me have, quite admirably, suggested that there are alternative systems out there that need to be considered in drafting of this regulation. I just have some general comments I want to make because, again, I'm only assuming negatives that have not been entered as evidence into the record and, at the conclusion, I'm going to suggest that we are willing to provide full cooperation with the Department of Environmental Protection as they look into incorporating these systems and the use of copper in these. Copper piping systems have been used in Connecticut and throughout the country. It's currently approved in both all of the plumbing and mechanical codes for use of above-ground, underground, with no limit on depth for potable water distribution, air conditioning, and refrigeration, medical gas distribution, and a whole variety of piping systems. Approximately 50 to 60 percent of all water

services installed today in the U.S. utilize copper piping systems. If you were to look in Connecticut and in the Northeast itself, a much higher percentage of these are copper-based. They've been delivering potable water to your citizens and to citizens around the country and around the world; here, for over 70 years in the United States, when the first standards for copper piping were written and up to 5,000 years when copper was man's earliest known engineered metal. Within the United States, in our buildings, approximately 70 percent of all of the potable water that you drink in all of the systems are copper-based. The copper tube on the drinking water side is NSF61 certified for potable water use. And, on the air conditioner/refrigeration side, the copper probably is about 90 to 95 percent of the piping used for heat exchange in HVAC and air conditioning systems containing the refrigerants that we're talking about today, and has been since the advent of air conditioning and refrigeration in this country. Copper is very stable in underground applications. It's one of the few metallic elements occurring in its elemental form in nature. And actually, someone mentioned earlier that this is the copper valley of Connecticut. This is where actually the copper industry in the United States started. So, Connecticut has a higher concentration of copper in the ground and likely in the ground water than many states in the U.S. The environmental impact of the use of copper piping and copper, overall, in building construction systems has been studied over-and-over. We've done quite a bit of research ourselves. Recent research in the State of Connecticut at the University of Connecticut on copper roofing systems and runoff and the impact and toxicity of copper on plant life, human health, and ground water systems showed that copper runoff and copper in water systems is readily bound

by organic compounds, rendering is not bio-available and non-toxic. The systems that we're talking about today, in addition to the fact that copper in the ground is generally very stable, very resistant to closing by itself in areas where there may be soil conditions that might promote corrosivity, the grouting and the backfill protections offered in the current regulation adequately addresses those concerns. So, those are just my comments, briefly. I just want to address the fact that there have been anecdotal negatives thrown out and, as a worldwide association representing the copper industry and research done in the copper industry, we offer our support and help in the Department of Environmental Protection's investigation into the applicability of the use of copper in trying to regulate a material that has been used in Connecticut for quite some time.

NAHAS: Thank you very much. Michael Sumple.

SUMPLE: My name is Michael Sumple. I'm the owner of CHW, LLC, in New Milford, Connecticut. I've been installing DX geothermal systems since the year 2000 in New England; mostly in Connecticut. Twenty-five percent of those installations have been at existing homes. And, one of the reasons why, is that the drilling equipment that I have has a much smaller profile where we can get into small parcels of land and drill either alongside of a building or behind it. And, in New England, New England has a huge market for geothermal and, due to the size of these plots, the DX system is the ideal system because we can get in with smaller equipment. And, as I said, there are hundreds or thousands or millions of homes that use oil to heat their homes. There are even some coal furnaces still around. So, the DX is the most sensible system to use to

replace these existing oil systems that are old, inefficient, and who knows if they're going to be able to buy oil next year to heat their homes. The DX geothermal heat pump is the most efficient product on the market for heating and air conditioning. It has the least amount of moving parts. The copper tubing that we install in the ground is 1,000 times more conductive than plastic tubing. The refrigerant – that's the 410, for instance – will boil it, minus 61-degrees. So, what happens is, let's say the copper should spring a leak – even though it's tested under high pressure – it will vaporize. Just think of heating a frying pan on a stove to red hot and just sprinkling water onto it. That water vaporizes immediately. At minus 61-degrees when the ground temperature in the State of Connecticut averages 52-degrees five-feet below the surface, that refrigerant will vaporize and just go through the soil and dissipate. As Andy had said, the copper, from a health standpoint, is really not an issue. If anybody takes supplemental vitamins, when you go home, take a look at the back of your bottle, it actually has copper in it. So, I don't see that being a health issue. So, the DX system, in my opinion after installing (as I said) for the last seven years, I've had no issues of any problems of leakage or any problems. They have been installed right in the earth loops. The way I look at it is, it's a future product for heating and air conditioning our homes of the future. I also have (which I'd like to submit, which was just passed in the State of West Virginia) legislation for well drilling, design standards and regulations, and it specifies DX refrigerant systems. One is a regulation and one is a standard.

NAHAS: They are two different things?

SUMPLE: Yeah.

NAHAS: I'll enter as Exhibit S, from West Virginia, it was passed on March 8, 2008, the Water Well Design Standards. That will be S. And, the Water Well Regulations for the State of West Virginia that was passed on March 8, 2008 will be T.

SUMPLE: I have some additional correspondence that I'll forward to the Committee.

NAHAS: Yes. We will be holding the record open. Thank you. The next speaker is Dennis Cleary.

CLEARY: My name is Dennis Cleary and I represent the Connecticut Water Well Association. I'd first like to thank all of the folks that have worked over the last three years on these Regulations. The Commissioners of Environmental Protection, Health, and Consumer Protection; and all of their key staff have worked on these regulations for, it will be three years next month; in order to update, to look at areas that they felt licensing should be employed, to look at standards for that licensing, to look at separation distances, to look at a number of issues that are addressed in the regulations that are aimed at protection of the aquifer in the State of Connecticut. Also, the Plumbing and Piping Board that, again, in an early draft (I think) two years ago and has recently approved these regulations as well. The Connecticut Director of Health has had input into these regulations. And, many of them came about by concerns (and a good number from the health advocates – both local and state) with drilling going on in the state without folks that had particular licenses, without permits being taken, without any completion reports being required to be filed with local health departments, and without separating distances from other potential contaminants or water wells.

That's how we got involved; basically in combination with those three state departments to bring some expertise to the table and to look at the continued protection of the aquifer in Connecticut. We have absolutely no intent of sitting here and reducing the level of any other type of application for geothermal. We believe that geothermal is an important part of energy development in the State of Connecticut. And, if other folks want to bring forth regulations on other types of issues, I think that's fine. Provided that the licensing is in place and the permitting and reporting is in place, then I would believe that the state departments would certainly, at least, look at that information. I do know – I guess there are a number of states that have already outlawed DX systems. Exactly why – I'm not an expert in the technical aspects of that field. I'm really not sure. Particularly what was addressed in these regulations was closed loop geothermal systems. That was really the emphasis. Trying to distinguish those from – as somebody said – the old pump and dump systems, which basically were water wells. And, those systems were less efficient, as well as the number of wells that you could put on a particular site because they were considered water wells and still are under these regulations. It was difficult in order to get the distances necessary for those. So, these are basically for non water wells, closed loop systems, geothermal bore holes. So, there is no intent to create any type of monopoly. We did cooperate with the three state departments; many of which have a lot of give-and-take. What the Health Department wanted to do, Consumer Protection thought it should be done a little different and Environmental Protection thought it should be done a little bit different. So, the three departments came together and, over three years, hashed out to come to

some common ground to put in place what they thought was really lacking, and that was the permitting and follow-up with completion reports, etc. for geothermal bore holes that have been drilled in the State of Connecticut without permits or requirement for permits, without completion reports being filed to either DEP or to a local health department. And, the departments really thought that that was a real inadequacy in the regulations. So, this brings forth the permitting, the reporting, the licensing. There is only one suggestion that we have for a future draft of this regulation, should there become a future draft – to look at the apprentice portion of the program and to look to work with the Department of Consumer Protection on a trainee program instead of an apprentice program and to be able to just make sure it's clear in the regulations that the Department of Consumer Protection would be able to continue to oversee that program and to write the appropriate requirements on going for that program. That's all I have to say, and I'm sure that others have other things to say. But, there is no intent here to eliminate anybody. And, I think the state departments, in the past, have said that they are willing to listen and they are willing to work with other groups to write regulations, but to not leave it as an unregulated industry. And, I think that has, at least, been my understanding of what they're looking for. Thank you.

NAHAS: Thank you. And, Mr. Cleary, we are going to be holding the record open. So, before the conclusion of the record, if you can just identify – you mentioned that some states outlawed DX. If you could just identify which states those are.

CLEARY: Sure.

A VOICE: Can you identify those now?

NAHAS: Mr. Cleary, do you know which states they are?

CLEARY: I know that Michigan currently does.

A VOICE: Minnesota.

CLEARY: Minnesota. I do not have the rest of the list. I was told there were 14, but I can't confirm that.

NAHAS: Okay. That would be helpful if you can give us more information on that. Mr. George Sima.

SIMA: I'm here. I sit on the Plumbing and Piping Examining Board, which regulates the water well industry. At our last board meeting, we reviewed the regulations and the Board feels that, as this sits, it's a step in the right direction in that Connecticut prides itself in licensing contractors to get the proper work done and have it done right. And, like I said, the Board is all in favor of any new regulations that come about; whatever they may be. That's all I just wanted to say.

NAHAS: Thank you. Don Creyts.

CREYTS: First of all, I'd like to enter into the record, a letter from John Kelly, Executive Director of the Geothermal Heat Pump Consortium. In this letter, he basically recommended that the State of Connecticut develop appropriate regulations for both the water well geo-exchange and the direct exchange systems.

NAHAS: Thank you. This letter from John Kelly, Executive Director, Geo-Exchange, dated April 18, 2008, to Commissioner Farrell will be entered and marked as Exhibit U.

CREYTS: I am President of ECR Industries doing business as Advanced Geothermal Technology. I founded the company in 1989 and we've been installing geothermal systems ever since. As a bit of history, as a young fellow, my dad and his dad were both dairy farmers in the State of Michigan. I'm well aware of the environmental issues that we are facing in today's economy. I also wish to point out that, on my mother's side, my grandfather was a copper miner and was superintendent of copper smelting in the State of Michigan when I was a young fellow. So, I have extensive experience with copper as well as the environment. I have several documents to enter into the record.

NAHAS: We will enter as Exhibit V, a letter from Don Creyts, President of Advanced Geothermal Technology to Commissioner Farrell and the letter has a number of enclosures and attachments. And, that will be entered as V.

CREYTS: I'd like to just read a short summary of my letter. We installed our first system in the State of Connecticut in West Simsbury back in 1995. It is still in operation today. Since then, we have continued to install systems in the State of Connecticut. We have drilled over 500 holes using rock drills provided by the rock drilling and blasting industry. Tens of thousands of holes have also been drilled for our systems throughout the United States. These angled holes are 3 inches in diameter and about 70 feet and less than a vertical depth of 60 feet. The only materials that we use are non-toxic, as determined by the U.S. EPA. To date, no one has ever informed us that any of these systems have ever contributed to or have been a source of ground and/or ground water pollution. I also believe that that's true of the other direct exchange

manufacturers. We, therefore, question whether the State of Connecticut should even issue special regulations regarding drilling requirements for the installation of geothermal systems. It is our perspective that sufficient regulations already exist regarding air and water quality standards that the industry has to follow, and that additional regulations would only serve to increase the installed cost of geothermal systems to the consumers in the State of Connecticut at a time when it is critical that we reduce our fossil fuels and the greenhouse gases created by their use. If the State of Connecticut decides that it is necessary to regulate the geothermal industry, it would be our recommendation that the regulations be general in nature and that all trades (including HVAC, electrical, plumbing, drilling both water well and rock drillers, sheet metal, etc.) be required to install geothermal systems in accordance with the respective manufacturer's recommendations. Attached to this letter are many documents supporting the general information contained in this letter. We trust that you will carefully evaluate the information and revise the proposed regulations so that all of the consumers in the State of Connecticut can continue to choose the benefits of any geothermal heating and cooling system at the lowest installed cost. I'm in this business because I believe in the future. I have eight children; two of which have doctorate degrees, one of which has a doctorate from the University of California Berkeley and he was the project manager for McKenzie and Company, which just issued this report on greenhouse gas emissions. It has been highly recommended reading for federal and state governments. I also have another son who has a doctorate in earth sciences. He is a glaciologist who has been studying the impact that the environment has had on the

glaciers. I have seven grandchildren. I would like to see this world give them a better future, and greenhouse gases is not the answer. I note that the State of Connecticut does not regulate point source emissions from chimneys located in houses. It is my opinion that the State of Connecticut does not need a regulation for geothermal systems since there are already sufficient existing regulations to cover the industry. Thank you very much.

NAHAS: Thank you very much. Paul LaFramboise.

LAFRAMBOISE: Hi. I'm Paul LaFramboise. I'm a master ground water contractor and certified installer. Our company does drilling for every aspect of holes that are required in the ground. We do drill holes from 2-inches to 30-inches. I've worked with many of you people that are here in this room. We install a great number of geo-exchange holes. Currently, this year, we're probably doing in the vicinity of five to six hundred in the State of Connecticut, this year alone. We've also drilled direct exchange holes in Connecticut, Massachusetts, Rhode Island, Tennessee, South Carolina. And, in addition, I've been involved with some of the people here in the State of Connecticut in drafting these regulations. I've been fortunate enough to work with people to have some input. I think, ultimately, what the state was looking for here was to really protect the public health and safety. From a ground water point of view, these regulations certainly make a great deal of sense in that – Ray spoke about separating distances, having requirements for separating distances, having recording requirements, having permits required. All of those things make sense. The current regulation says that the license is limited in the scope of their work. So, if somebody is running copper tubing

out there and they need to braze it or solder it, that comes under a license, and I'm not exactly sure what the license is. If you're drilling a hole and you're grouting it and you're grouting it properly, that comes under a license. That license is, under these draft regulations, a W7 or a W1. All of those things, I believe, make sense. I don't think that there is any intent here to outlaw direct exchange systems. I think what the intent is, is to make sure that public safety is ultimately first and foremost. People talked about this not being specialized. Well, it is specialized. I think that any time that we put a hole in the ground and it opens up to something that may affect any number of people by the transmission of water in the ground, you'd better have somebody specialized and you'd better have somebody that knows what the heck they're doing to make sure that that's protected going forward. There are different geologies and, like I said, we're licensed to drill from basically the whole east coast. And, we've encountered things that we never thought were possible. And, I think that having current licensing within certain jurisdictions makes sense so that you're aware of those things as well. I don't think that anybody here is ever questioning the viability of geothermal. I think that geothermal is terrific. I think it's terrific for our business. I think it's terrific for everybody's business and for the earth as a whole. I just want to make sure that it's done properly to protect the public's health going forward. Thank you.

NAHAS: Thank you. Jeff Brissette.

BRISSETTE: My name is Jeff Brissette. I'm with Plimpton and Hills out of Hartford, Connecticut. I'm also a certified installer. I feel like a kid amongst the rest of you. I've only been doing it about 25 years in terms of designing heating systems. But,

essentially, that's what we're talking about with geothermal. We're talking about heating systems and what goes-on in the ground is part of a heating system. It's the heat exchanger. That should come pretty much fully, I think, underneath the licenses of these men here; heating and cooling contractors, the guys that carry the heating licenses. I commend Consumer Protection for making steps in the way of protecting the consumers, the Environmental Protection for protecting the environment, but what we're asking here isn't really a service to the homeowner or the public in general when we have people – as Mr. LaFramboise said – specializing in making holes in the ground and we're asking them to get involved with designing a heating system. I think that someone mentioned tabling the proposals until we can get heating licensing people involved. I think that a serious look has to be taken at this. I see that you've followed the recommendations very closely. But, one thing I did notice was, I did not notice a difference between horizontal closed loop systems and vertical. Again, we have to make sure that that falls underneath the right licensing, in my opinion.

NAHAS: Thank you very much. That concludes the names that are on the signup sheet. Is there anyone else who is here who would like to speak who has not yet spoken or is there anyone who would like to make another statement, perhaps in view of anything else that has been said? Please state your name again.

FEUER: Robert Feuer, Smart Energy, Incorporated. After everyone is speaking, one of the things that needs to be mentioned or has been mentioned peripherally, but specifically, whether regulations are or aren't going to be developed,

whether or not they're going to actually be a part of this existing document. What needs to happen...

(PAUSE TO CHANGE CASSETTE TAPE)

FEUER: Geothermal systems is regulated independently and not brought together as one single entity, one single process, or one single specific technology all lumped under geothermal. The fact that each of these types of geothermal systems are installed in a very specific and very different manner at different depths, at different bore holes sizing, different types of materials, liquids, sand, grouting, etc would dictate a common sense approach that if you're doing something in a different manner, it should be viewed independently. It should have its own group or specific body that it looks-at and enforces it, and moving forward, everybody benefits if those rules and regulations are made for health, wellness, benefit, and most of all, the planet that we all share. Thank you.

NAHAS: Thank you very much. Yes?

MILLER: Chris Miller. BBB Mechanical Services out of Ellington, Connecticut. Just in adding to what was just said, I've read through the Regulations. I have an idea what was in there. I do believe it said something about the piping and what went through the ground had to be a liquid, which would be incorrect, I believe, if you were trying to work with refrigerants, which are not a liquid. They will change state. They will move back-and-forth. But, clearly on a standard DX system, what enters the ground is a liquid or what comes into the ground in the tubing comes-in as a liquid and comes-out as a liquid. In the DX side of things, that is not the way things work. So, I just would

like to point that out. I do believe I saw that. I can't specifically say all of the detail on it, but I believe that was there. But, also, in cementing the need for geothermal as a whole. DX, I think, is a wonderful thing. I can see many, many benefits to it. I do like the technology. Again, I've worked with all of it from the earliest to what seems to be the latest at this particular point in time. But again, I would not want to see anything that we're doing be regulated out as – I just don't want to miss the boat on all of that. Thank you very much.

NAHAS: Thank you very much. Yes.

HENCH: I have something I want to add. My name is Mel Hensch, once again. I would like to state, for the record, that unsubstantiated anecdotal reports of 14 states having banned DX system is inappropriate and should be stricken from the record without the list of those states.

NAHAS: Mr. Cleary has an opportunity to provide that. If, in fact, at the end of the record – we'll see what comes up in two weeks.

HENCH: Very good. Thank you.

NAHAS: Thank you. If there is nothing further, I will review the procedure at this point. I thank everyone for coming. I thank you all for your comments. I appreciate the fact and the Department appreciates the fact that many of you have come from far away. We will review the testimony and the documents that have been made part of the record. We'll have the transcript sent out. Again, if anyone wants copies of the exhibits, please let us know. We will then determine whether any changes should be made to the regulations as published in the Connecticut Law Journal. Pursuant to the Uniform

Administrative Procedures Act, at that point, we will then forward the proposed regulations to the Attorney General's Office, where they will review them for legal sufficiency. They have up to 30 days to do so. If approved for legal sufficiency, the regulations are then forwarded to the Legislative Regulation Review Committee for their consideration. We will hold the record open to allow the opportunity for anyone else to either provide supplemental information or new information, until May 12, 2008, which should be a Monday. It would be helpful if people do submit additional changes, if they can specify which sections of the proposed regulations they have the most issues with. Specifics would be very helpful; even if you take copies of the regulations and make notes on the sides and then just submit that. Probably, the easiest thing to do would be if everyone could submit those additional submissions to my attention, and my name is Elisa Nahas (N-A-H-A-S), Legal Director for the Department of Consumer Protection, and my room number is 100 at the State Office Building. My email address is Elisa.Nahas@ct.gov. Again, I thank you all for coming. I appreciate everyone's comments and I note that the hearing is adjourned. I note that the time is approximately 1 o'clock. Thank you.

CERTIFICATION

PUBLIC HEARING

PROPOSED REGULATIONS CONCERNING
WELL DRILLING

I hereby certify that the foregoing is a true and correct transcript of the cassette tapes in the above-entitled Public Hearing heard before ELISA NAHAS, Hearing Officer, on the 22nd day of April, 2008.

Dated this 20th day of May, 2008, at Shelton, Connecticut.

A handwritten signature in cursive script that reads "Rose E. Brown". The signature is written in black ink and is positioned above a solid horizontal line.

Rose E. Brown
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