

Sources of Additional Water for EBMUD (1985), at p. 7.). "[T]he concern for quality of the source [of drinking water] is found in the appendix to the EPA National Interim Primary Drinking Water Regulations of 1976 (40 CFR 141): 'Production of water that poses no threat to the consumer's health depends on continuous protection. Because of human frailties associated with protection, priority should be given to selection of the purest source. Polluted sources should not be used unless other sources are economically unavailable, and then only when personnel, equipment, and operating procedures can be depended on to purify and otherwise continuously protect the drinking water supply.' [Emphasis added.]" (Daniel A. Okun, Robert H. Harris & Robert Tardiff, supra, at p. 7.)

Accordingly, given the serious risks posed by the East Valley Project, it is clear that sound public policy (in addition to CEQA) require that a new EIR be prepared to fully evaluate and disclose to the public the new scientific information on the risks involved. Given the numerous problems which have been identified with the East Valley Project, Petitioner's request that the Regional Board prepare a new EIR for the project was and is meant to be conciliatory. Before public agencies embark on such projects, it is necessary to have the best possible information concerning the potential environmental and public health issues.

II.

ARGUMENT

A. CEQA Requires That A New Environmental Impact Report Be Prepared For The East Valley Project.

Public Resources Code § 21166 provides:

"When an environmental impact report has been prepared for a project pursuant to this division, no subsequent or supplemental environmental impact report shall be required by the lead agency or by any responsible agency, unless one or more of the following events occurs:

- (a) Substantial changes are proposed in the project which will require major revisions of the environmental impact report.
- (b) Substantial changes occur with respect to the circumstances under which the project is being undertaken which will require major revisions in the environmental impact report.
- (c) New information, which was not known and could not have been known at the time of the environmental impact report was certified as complete, becomes available."

In the present case, it is clear that a new EIR is required for the East Valley Project because (1) substantial new information has

become available which was not known at the time DWP prepared its 1991 EIR, and (2) substantial changes have occurred in the circumstances under which the project is being undertaken which requires a major revision in the EIR's conclusions.² For the State Board's convenience, each of these issues will be discussed in turn.

² Unfortunately, the Regional Board applied incorrect legal standards in deciding not to prepare a new EIR for the new East Valley Project. The RWQCB assumed that the proper legal test is whether the new project (as modified by the RWQCB staff) will harm the environment. That is not the appropriate test. (Of course, even if that were the proper test, it is clear that, taking the record as a whole, the agency's decision to proceed without a new EIR is arbitrary and capricious.) Even assuming arguendo that the old EIR had some legal relevance, the question under CEQA is whether new information or circumstances have developed rendering the 1991 EIR incomplete, incorrect or misleading in some way. In the present case, the RWQCB's staff apparently concluded that the Old East Valley Project was environmentally unacceptable and therefore imposed a number of requirements for the new East Valley Project which were not contemplated (much less analyzed) in the 1991 EIR. These changes include, inter alia, limiting the new East Valley Project to three years as a demonstration project, capping sewage discharge into the drinking water at 10,000 acre feet per year, and requiring a virus study to be completed prior to spreading the sewage plant wastewaters. (See Draft Order dated September 8, 1995, pp. 5-6.) In other words, RWQCB implicitly concluded that the Old East Valley Project (designed as a permanent 50,000 acre foot project) could have significant adverse impacts on the environment and, for that reason, imposed additional health and environmental protection requirements. However, the RWQCB staff's conclusion directly contradicts the old EIR's categorical assertion that the Old East Valley Project will not have any significant adverse impacts (see FEIR, p. 1-2) and, by itself, constitutes new and significant information requiring the preparation of a new EIR. The fact that the RWQCB staff may have concluded that the new East Valley Project is sufficiently limited (e.g., by requiring a post-approval but pre-spreading virus testing program) to avoid the obvious risks of the Old East Valley Project does not satisfy the legal requirement for a new EIR. As the State Board is undoubtedly well aware, the purpose of a new EIR is to inform the public as well as to inform the board. (Laurel Heights Improvement Assn. v. Regents of the University of California (1988) 47 Cal.3d 376, 392.)

B. A New EIR Is Required For The East Valley Project Because Important New Information Establishing That The East Valley Project Will Have Adverse Environmental Impacts And That There Are A Number Of Superior Project Alternatives Has Become Available Since The DWP Published The 1991 EIR.

Simply put, there is now a wealth of new scientific evidence establishing that the State Board is legally obligated to prepare a new EIR prior to approving the East Valley Project.³ For example, the new information requiring such an EIR (which identifies significant impacts which were ignored or improperly ruled out in the 1991 EIR for the project) includes, but is not limited to, the various expert reports which were presented during the administrative and legal proceedings concerning the San Gabriel Project. (As the State Board is undoubtedly aware, the San Gabriel Project had proposed to dump recycled wastewaters in an aquifer used by one million people for drinking water purposes.) Even if the State Board were to ignore all other relevant evidence, the wealth of new scientific information about the East Valley Project's health and environmental risks developed in the San Gabriel case would by itself require the preparation of a new EIR for the project. While it would be impractical to recapitulate the wealth of new scientific information contained in the statements of Professor Daniel Okun, Professor Talbot Page, Dr. Robert Plancey,

³ On a related note, it is worth observing that the CEQA Guidelines unambiguously require the State Board to assume lead agency status in this case. Guidelines § 15052(a) states that the responsible agency "shall" assume lead agency status if "a subsequent EIR is required", and Guidelines § 15005 confirms that the term "shall" means that the requirement is mandatory and binding on all agencies.

Dr. Harvey Frey, Mr. John Beach, Professor John List, Professor Ruben McDavid, and Mr. Henry Ongerth (which were submitted to the Regional Board) in this Petition, several illustrative examples are provided in the following sections, and several of the statements are enclosed as Exhibits "7" through "29" hereto.

1. New Information Concerning The Inadequacy Of Soil Treatment As A Filtration Measure For Chemical Pollutants.

The Regional Board's decision to approve the East Valley Project is based on the incorrect assumption that DWP can rely on percolation through the soil underlying the Hansen spreading grounds to properly treat the Tillman Sewage Plant's effluents and thus render such effluents suitable for human consumption. However, this assumption is incorrect.

For example, Professor Daniel Okun, who is clearly one of the most respected experts in the field and a member of the 1987 blue ribbon Scientific Advisory Panel on Groundwater Recharge with Reclaimed Wastewater ("SAP") convened by the State of California, carefully studied the issue and concluded that:

"Removal of trace contaminants is an essential requirement for potable reuse. Passage through the soil is not a reliable barrier. If potable reuse is to be undertaken, incorporation of barriers similar to those at Water Factory 21 [e.g., reverse osmosis and granular activated

carbon filtration] are necessary." (Okun Decl. I, Exhibit "7", at p. 30, ¶ 47(2).)⁴

Mr. Henry Ongerth independently studied the issue and reached the same conclusion (Ongerth Decl. III, Exhibit "16", at pp. 1-2, ¶ 2).

2. New Information Concerning The Inadequacy Of The 1984 Health Effects Study Conducted By The Los Angeles County Sanitation Districts.

DWP and other sewage agencies rely heavily upon the 1984 Health Effects Study conducted by the County Sanitation Districts of Los Angeles County to support their assertion that the consumption of reclaimed wastewaters is safe. However, objective expert evaluations of the 1984 Health Effects Study (*i.e.*, evaluations not commissioned by water or sewage agencies) have consistently concluded that the health effects study lacked the statistical power necessary to determine whether or not consumption of reclaimed sewage waters is safe. (See, *e.g.*, Page Decl. I, Exhibit "9", at pp. 1-4, ¶¶ 3-10; Ongerth Decl. I, Exhibit "11", at p. 7, ¶ 9.)

Indeed, in 1994, the National Research Council ("NRC") reviewed the available data, including the 1984 Health Effects Study and concluded that, given the inadequacies of the studies done so far, it is simply not possible to tell whether recharge using waters of impaired quality (*e.g.*, recycled sewage plant effluents) has injured the public. (NRC, Groundwater Recharge Using Waters of Impaired Quality ("NRC Report") (1994), at p. 143.)

⁴ Orange County's Water Factory 21 project is well-known for using advanced wastewater treatment methods including reverse osmosis and granular activated carbon filtration.

To quote the NRC Report: "The assessment of health risks associated with recharge using impaired sources is far from definitive because there are limited chemical and toxicological data and inherent limitations in the available toxicological and epidemiological methods." (*Id.*, at p. 133.) Given DWP's heavy reliance on the 1984 Health Effects Study, it is clear that the foregoing new information mandates that a new EIR be prepared.

3. The Results of New Legionella Tests On Tertiary Treated Wastewaters.

Since 1991, scientific research has developed a wealth of information demonstrating that sewage-to-drinking water projects present a number of heretofore unidentified health risks. One of the prime limitations on the availability of such information may be censorship imposed by the sewage and wastewater agencies. For example, the County Sanitation Districts of Orange County ("CSDOC") censored a study by its own scientists that found high levels of the bacteria which causes Legionnaire's Disease in sewage plant effluents similar to those planned for the East Valley, San Gabriel Valley and Montebello Forebay projects. A copy of the memorandum signed by six CSDOC scientists complaining about the censorship is enclosed as Exhibit "30" hereto. A set of posters summarizing the results of the CSDOC study is enclosed as Exhibit "31" hereto. What is extraordinary about the CSDOC study is not its conclusions about the presence of Legionella (which are of serious concern) or the fact that the results were subject to censorship (which is apparently not unusual), but the fact that six reputable scientists were apparently willing to risk their jobs to protest the censorship.

4. The Las Virgenes Virus Study.

The virus study commissioned by the Las Virgenes Municipal Water District ("LVMWD") used both PCR testing and the more primitive tissue culture testing to study whether viruses can survive tertiary treatment and chlorination.⁵ On August 4, 1995, the Los Angeles County Superior Court invalidated the EIR for the San Gabriel Project, which is similar to (but admittedly much worse than) the East Valley Project, and ordered the lead agency to prepare a new EIR which takes into account the LVMWD virus study. (See Exhibit "4".) The Court's decision to invalidate the San Gabriel Project EIR in light of the LVMWD virus study conclusively establishes that the study, by itself, constitutes new and significant information requiring the preparation of a new EIR for the East Valley Project. To quote Professor McDavid:

"17. Part of the Malibu study involved virus testing of the final chlorinated effluents of the Tapia Water Reclamation Facility. Using Polymerase Chain Reaction (PCR) genetic testing methods, the Malibu study's authors found viruses such as hepatitis A and rotavirus in three of eleven months during which virus tests were conducted. The authors also used a more primitive and less sensitive virus assay system, namely tissue culture, to find an infective virus in one of the three months which yielded positive PCR virus results. Any positive virus result using primitive

⁵ For the Board's convenience, an excerpt from the final report on the project is enclosed as Exhibit "32" hereto. Additional relevant material (including the declaration by Professor McDavid which was relied upon by the Court to invalidate the San Gabriel Project) are enclosed as Exhibit "21" hereto.

tissue culturing methods is very significant because the methods cannot detect approximately 80 percent of the more than 120 possible enteric viruses (such as Hepatitis A) that may be found in wastewater. In addition, the low accuracy of the primitive tests mean that the tests miss a majority of the viruses within the 20 percent of the possible enteric viruses which have a theoretical chance of being detected by the primitive methods. Given the extremely low accuracy and uncertainties of the primitive tissue-culture-type virus tests relied upon by LACSD, the Malibu study test results are very significant."

"18. The Malibu study used a state-of-the-art genetic technology for virus analysis. The results of the Malibu study indicate that the range of virus concentrations could be underestimated by a few orders of magnitude in previous studies based on tissue culture methods because these methods do not provide an adequate detection tool. Therefore, the current Title 22 water reclamation standards may not assure adequate virus removal. Based on the Malibu virus tests, it is urged that reverse-transcriptase polymerase chain reaction (RT-PCR) studies be required for the SJCWRP effluents due to the advantages of this genetic technology method over the tissue culture method. The benefits of PCR over tissue culture can be attributed to: (1) the fact that tissue culture does not detect all different types of enteroviruses, and (2) genetic technology is more sensitive and specific than tissue culture and less virus needs to be present in the sample

for detection to occur. From a public health perspective and absent RT-PCR data to the contrary, it should be assumed that the SJCWRP contain a comparable amount of viruses as the SJCWRP effluents in the Malibu study."

Thus, despite its limits, the LVMWD virus study, which according to its authors used "the best available technology", provides significant new information which more than amply justifies the requirement of a new EIR for the East Valley Project.⁶

5. New Data On The Survivability and Migration of Pathogens In Aquifers.

At the January 18, 1992 conference sponsored by the City of Malibu and Save Our Coast, Dr. Jay Grimes, a noted microbiologist, presented a large quantity of important information relating to the health risks associated with treated wastewater. The relevant findings of Dr. Grimes included, without limitation, the following: (1) even assuming that there are no cracks or fissures in the aquifer to facilitate pathogen transport, pathogens can survive months or even years in the groundwater;⁷ (2) chlorination, rather than destroying all of the relevant pathogens may facilitate the transformation of bacteria into viable, but not

⁶ Unfortunately, in a transparent attempt to minimize the significance of its own consultant's virus study, the LVMWD has put out some misleading information about the study. Significantly, the LVMWD did not even release the results of the virus study to the general public until after its receipt of Petitioner's formal Public Records Act request for the information, which was several months after the tests had been completed. (Petitioner had learned of the existence of the study from Save Our Coast.)

⁷ Dr. Grimes's conclusion about the role cracks and fissures can play in the transport of pathogens is supported by the study of the outbreak of the Norwalk Virus in Arizona. A copy of the study is enclosed as Exhibit "33" hereto.

culturable ("VBNC"), forms which will not be detected by conventional water quality tests; and (3) chemicals in some wastewaters actually stimulate the growth of some harmful bacteria.

6. The Los Angeles Cryptosporidium and Giardia Testing.

Over the past two years, CSDLAC has been conducting tests for the presence of Cryptosporidium and Giardia in the effluents of the San Jose Creek water reclamation plant ("SJC plant"). The tests conducted thus far by CSDLAC indicate Giardia was consistently present in the SJC plant's final effluents and that Cryptosporidium was present in three of seven final effluent samples.⁸ For example, in the last two tests for which we have received data, CSDLAC found 0.2 and 0.6 Cryptosporidium oocysts per liter, respectively. The relatively high numbers (equivalent to 20 or 60 oocysts/100L) found by CSDLAC present a serious public health risk. (See Attachment "B" to McDavid Decl. III, Exhibit "21".) Moreover, the CSDLAC tests should be assumed to substantially underestimate the presence of the parasites due to the low recovery rate of the ICR tests for Giardia and Cryptosporidium. (McDavid Decl. III, Exhibit "21", ¶ 10.)

7. New Information Concerning The Potential For Pathogen Gene Transfer In The Soil Resulting From The East Valley Project's Recharge Activity.

The East Valley Project EIR should also be rewritten to take into account new information about the "increased potential for pathogen gene transfer in the soil that will result from the

⁸ The term "indicate" is used advisedly because the CSDLAC personnel involved in the testing were not able to definitively confirm the identity of the cysts which looked like Giardia and Cryptosporidium.

Project's recharge activity. The recharged sewage plant effluents will almost certainly contain a variety of non-viable organisms. Although the organisms themselves may not be viable, the potential exists for the incorporation of their DNA into soil bacteria so that the natural soil bacteria become vectors for the transmission of disease or increased immunity to antibiotics. The possibility of such gene transfer activity is well-documented in recent scientific literature, which has clearly shown the transfer for gene transfer to occur in microbial communities located in moist soils. Of particular concern are the DNA segments responsible for antibiotic immunity in that many antibiotics are derived from organisms endemic in the soils." (List Decl. I, Exhibit "8", at pp. 3-4, ¶ 8.) The significance of the last issue cannot be overstated given the mounting evidence of ever-increasing antibiotic immunity in virtually all human pathogens. (See, e.g., Exhibit "35".)

8. New Evidence Concerning Estrogenic Compounds In Wastewater.

Since 1991, a number of studies have been published documenting the problems caused by estrogenic compounds in wastewater. (See, e.g., Attachment "D" to McDavid Decl. I, Exhibit "15". See also Exhibits "37" to "45".) The 1991 EIR does not even disclose the issue made less take into account the wealth of relevant new information that has become available.

9. The New Evidence Concerning Algal Toxins.

As a source rich in nutrients (i.e., from fecal matter), recycled water may induce algal blooms in the spreading grounds. Unfortunately, new information has established that algal toxins

can wreak havoc on the wildlife (even if the toxins never reach human consumers). (See, e.g., Exhibit "34".) The State Board should thoroughly investigate the algal toxin issue in a new EIR for the East Valley Project.

10. New Evidence of Chloride and TDS Pollution Caused by Wastewater Recharge Projects.

Recent scientific information has established that wastewater recharge projects similar to the East Valley Project have resulted in the pollution of the ground water with chloride and total dissolved solids ("TDS"). For example, as stated in a letter dated May 4, 1995 to RWQCB from CSDLAC, recent testing has confirmed that the chloride levels and sewage plant effluents are now frequently exceeding discharge permit limitations, as well as water quality objectives. In addition, recent studies have shown that the extremely high TDS levels in sewer plant effluents present significant adverse environmental impacts. (See, e.g., Exhibit "36", Total Dissolved Solids and Groundwater Protection, May 1994, by G. Fred Lee and Ann Jones-Lee (concluding that reverse osmosis treatment should be used to reduce the TDS and other pollutant levels in recycled wastewater).)

11. New Evidence of the Feasibility of Alternative Treatment Methods.

In the 1991 EIR for the Old East Valley Project, the DWP did not consider any possible project alternatives involving the use of advanced wastewater treatment ("AWT") methods. Since 1991, critical evidence has become available which confirms that such AWT methods are effective and feasible.

For example, in 1992 the City of San Diego released a report which confirmed that an AWT treatment train which included reverse osmosis and other advanced techniques would be effective in reducing both the organic compounds and pathogens in sewage plant effluents. (Exhibit "46".) Similarly, Drs. Lee and Jones-Lee have studied the issue and concluded that the use of reverse osmosis to further treat tertiary treated sewage plant effluents is cost-effective. (Exhibit "36", p. 4.) And there is an abundance of new evidence establishing that disinfection methods other than chlorination are both feasible and environmentally superior. (See, e.g., NRC Report, at p. 123 [Discussing disinfection techniques involving ultraviolet radiation].)⁹

Accordingly, the State Board should commission a new EIR to investigate and fully disclose to the public the benefits of project alternatives involving advanced wastewater treatment.

C. Changes In The Circumstances Under Which The Project Is Proposed To Be Undertaken Also Require Preparation Of A New EIR.

The regulatory environment in which the East Valley Project must be considered has changed substantially since 1991. For example, last year, the State Board amended resolution 92-49 by adopting a strong policy of requiring that cleanup actions be designed with the objective of restoring water to "background water quality, or the best water quality which is reasonable if

⁹ Furthermore, a Canadian study has confirmed that, although drinking water that meets current microbiological standards causes gastrointestinal illnesses, the use of reverse osmosis and granular activated carbon filtration can reduce gastrointestinal illnesses by 35 percent. (See Exhibit "47".)

background levels of water quality cannot be restored". In the present case, it is absurd to approve wastewater reclamation projects which unquestionably degrade the groundwater when the state's express goal is to clean up the groundwater to background quality. Put another way, given that even the project proponents concede that the East Valley Project will degrade groundwater quality, that degradation must be considered both significant and unacceptable in light of the new SWRCB policy.

As another example, state and federal agencies have been consistently adding to the list of contaminants being regulated over the years, and are moving towards strict controls on disinfection by-products. (Okun Decl. I, Exhibit "7", pp. 5-6, ¶ 11 & Fig. 1; id., p. 8, ¶ 13.) The 1991 EIR must be revised to reflect the new and proposed regulations for chemical contaminants and disinfection by-products.

D. Request for a Public Hearing.

Given the profound public importance of the environmental and public health issues raised by the East Valley Project, Petitioner respectfully requests that the State Board hold a duly noticed public hearing to discuss these issues.

III.

CONCLUSION

For all of the foregoing reasons, Petitioner Miller Brewing Company requests that the State Board grant its petition as prayed.

DATED: October 13, 1995

Respectfully submitted,

ROGERS & WELLS
TERRY O. KELLY
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By: 
Andrew J. Yamamoto

Attorneys for Petitioner
Miller Brewing Company

PROOF OF SERVICE BY MAIL

STATE OF CALIFORNIA)
)
COUNTY OF LOS ANGELES) ss

I, Victoria C.M. Dimond, am employed in the County of Los Angeles, State of California. I am over the age of 18 years and not a party to the within action; my business address is 444 South Flower Street, Ninth Floor, Los Angeles, California 90071.

On October 13, 1995, I served the foregoing: (1) PETITION OF THE MILLER BREWING COMPANY FOR REVIEW OF ORDER NO. 95-133; (2) EXHIBITS TO THE PETITION OF MILLER BREWING COMPANY FOR REVIEW OF ORDER NO. 95-133 (Volume I of II) and (3) EXHIBITS TO THE PETITION OF MILLER BREWING COMPANY FOR REVIEW OF ORDER NO. 95-133 (Volume II of II) on the interested parties in this action by placing a true copy thereof, enclosed in sealed envelopes, addressed as follows:

Mr. Gerald A. Gewe
Senior Waterworks Engineer
Water Engineering Design Division
City of Los Angeles
Department of Water and Power
111 North Hope Street
P. O. Box 111
Los Angeles, California 90051-0100

Robert P. Ghirelli, D.Env.
Executive Director
Regional Water Quality Control Board
Los Angeles Region
101 Centre Plaza Drive
Monterey Park, California 91754

I am readily familiar with the business practice of my place of employment in respect to the collection and processing of correspondence, pleadings and notices for mailing with the United States Postal Service.

The foregoing sealed envelope was placed for collection and mailing this date consistent with the ordinary business practice of my place of employment, so that it will be deposited this date with postage thereon fully paid with the United States Postal Service of Los Angeles, California, in the ordinary course of such business.

☒ (STATE) I certify (or declare) under penalty of perjury under the laws of the State of California that the foregoing is true and correct.

☐ (FEDERAL) I declare (or certify, verify or state) under penalty of perjury that the foregoing is true and correct, and that I am employed at the office of a member of the bar of this Court at whose direction the service was made.

Executed on October 13, 1995, at Los Angeles, California.

(Signature of Declarant)
Victoria C.M. Dimond

SINCE their introduction to the U.S. in the mid-1970s, composting toilets — also known as dry, waterless and/or biological toilets — have had some success in markets where a municipal sewer system either was inappropriate or unavailable. Large units with a central composting chamber underneath found a niche in public parks and highway rest stops. Smaller, appliance models filled a need for summer vacation homes, boats, island cottages and the like. However, with relatively few exceptions, attracting individual homeowners with access to a municipal sewer system has been a more difficult task.

One reason is regulatory. From the beginning, the industry has faced local plumbing codes that excluded their products from consideration, and skeptical regulators who, at best, approved them as "experimental." Sometimes, interested homeowners were permitted to include a composting toilet in new construction, but also were required to install sewer lines and a flush toilet.

Another obstacle the industry has had to overcome is that to own and use a composting toilet requires a commitment to recycle human waste, at least a minimal amount of maintenance and a basic understanding of the biological processes by which organic materials degrade. Manufacturers discovered that most American homeowners who grew up flushing never learned much about the by-products of their own bodies. "Try mentioning words like 'feces' or 'human excrement' with perfect strangers," suggests Patty Nolan, CEO of Clivus Multrum, the oldest U.S. manufacturer of composting toilets. "Unless they are new parents, they just don't like to talk about 'poop'."

"However," she continues, "when they see how a composting toilet works and that it doesn't smell, that's different. Even if they agree to talk about it, people aren't convinced it's a viable alternative until they actually open the door of a working unit and realize that the liquid doesn't smell like urine and the solid smells like good earth."

REGULATORY MOVEMENT

While some states always have been more progressive than others regarding alternatives to conventional on-site systems, there are indications that broader progress is being made in terms of regulations. In Massachusetts, for instance, the Department of Environmental Protection (DEP) recently amended the section of the state Environmental Code (Title 5) having to do with the design and construction of septic systems. In a broad sense, perhaps the most

Internal composting drums are insulated on the nonelectric Centrex model from Sun-Mar to help maintain compost temperatures.

TEC Ad Hoc Committee On Clean Water
P. O. Box 484 • Occidental, Ca. 95465

Ann Maurice (707) 874-3855 phone/FAX

FOR COMPOSTING TOILETS

Building on experience and practicality, the industry is positioned for wider public and regulatory acceptance.

David Riggle



significant thing about these revisions, according to Richard Chretien of the DEP, is that they codify an approval process for various "innovative and alternative" (I/A) technologies that provide substitutes for "one or more of the components of a conventional system while providing the same degree of environmental and public health protection."

"These alternatives are becoming more widely used for cost-effective upgrades of old failing systems on difficult sites which cannot accommodate a conventional system," notes the DEP. "I/A technologies also hold promise for enhanced wastewater treatment for new construction in environmentally sensitive areas, or for sites where conventional systems simply don't function properly."

In other words, manufacturers of composting toilets (as well as makers of recirculating sand filters, fixed film bacterial treatment processes, sequencing batch reactors and the like) can now apply for approval through official channels and be cited on a

SURVEYING OWNERS

IN FEBRUARY, 1996, The Center for Clean Development (CCD) began a mail survey of the owners of various commercial composting toilets in an effort to generate independent data on their long-term performance. Preliminary responses from 250 Carousel Toilet owners indicate a very high level of user satisfaction, according to Dave Rapaport. Owners who have so far responded have reported very few major problems and generally odor free operation of their toilets which have, in many cases, been in use for over 10 years. Final results of the survey will be available later this year.

PROPERTY OWNERS TURN TO COMPOSTING TOILETS FOR LEAST COST SOLUTIONS

JIM and Marilyn MacDonald, Hingham, Massachusetts remodeling contractors thought they had lost thousands of dollars on the four-bedroom home they had renovated as an investment property. When they prepared to sell the home, the septic system was deemed failed under Title 5, the state's newly tightened on-site wastewater disposal regulations. The leaching field was right on bedrock, wastewater drained into wetlands and there was no alternative site for the leaching bed. At first, it looked like the couple's only option was to install a zero discharge system or "tight" holding tank, i.e., a concrete box that contains the effluent and then requires pumping when an alarm goes off indicating it has reached its capacity. Installation cost would have been only about \$2,000, but the pumping costs at 16 cents a gallon would cost the home's inhabitants \$19,272 a year — or \$385,440 over the course of a 20-year mortgage. That made the home virtually unsalable.

In effect since March 31, 1995, Title 5 of the Massachusetts Environmental Code essentially tightened regulations on waste treatment systems in response to new data on ground and surface water contamination from nitrogen and pathogen transmission through saturated soils that threaten

public and environmental health. Many septic systems and cesspools have been deemed inadequate or nonfunctioning by Title 5, forcing property owners to replace them with new septic systems or "tight tanks" or seek alternatives. (Title 5 inspections typically only are required when title to a property is transferred or sold.) In many coastal communities, proximity to bodies of water and building right on ledgerrock create a situation where leaching cannot take place at workable rates.

To offer property owners more solutions, Title 5 approved alternatives to septic and holding tanks, including greywater systems, recirculating sand filters, package aerobic treatment plants and Wisconsin elevated sand mounds, as well as composting toilets. After investigating these alternative options with the assistance of Sustainable Strategies in Concord, the MacDonalds were able to come up with a solution to their problem for \$10,000. The home, now sold, will be installed with an ultra low flush toilet that flows to a Vera Carousel Composter in the basement. The home's greywater will drain into a Washwater Garden, an aerobic, trench based planting system where the water evaporates and is transpired by plants specially chosen for their high transpiration rates. The home's new owners

will still have to service the composter once a year, but composting will reduce the material in it to 10 percent its original volume.

"It got us out of a tough situation," says Marilyn MacDonald. "No one wanted a house that was going to cost as much as \$20,000 a year to run. And we're thrilled with the broader consequences of this system, the ecological aspect."

Sustainable Strategies, based in Concord, Mass., has since designed several more systems for property owners with similar problems, mostly along the seacoast, where homes are built right on ledgerrock. "Some of the systems incorporate a vacuum toilet, which moves wastes via vacuum power to the composter. Others have no flush toilet at all," says David del Porto, the principle of Sustainable Strategies and Water Conservation Systems, who has been designing and selling a wide variety of such installations for 23 years. "Ecological systems have come of age" del Porto continues. "They work and they save money. Ours is zero discharge and it's truly a closed loop. Nothing is wasted. It's a technology with ecological integrity that's installed by plumbers and serviced by professionals, just like your heating and cooling system."

— Carol Steinfeld

listing maintained by the state as "acceptable" for general use in both new construction and/or under remedial conditions.

"Fortunately, this revision has come hand in hand with a change in the state Plumbing Code," notes David del Porto of Water Conservation Systems and Sustainable Strategies in Concord, Massachusetts. "Previously, the Plumbing Code stipulated

that every dwelling or occupied building had to have a flush toilet or 'water closet.' So even though a new technology may have been environmentally acceptable, it couldn't get approval for installation unless it flushed."

A compromise was reached, del Porto reports, to insert language in the Plumbing Code so that "flush toilets" now include "alternative technologies approved by the Department of Environmental Protection and that have been approved by the Plumbing Board by name and model number." Another provision goes further and specifies that to have a technology so approved, manufacturers must demonstrate to the Board of Plumbing Examiners that the model in question has been tested and certified by the National Sanitation Foundation International (NSF), approved by DEP, or both."

"It's been a long haul," says Nolan of Clivus Multrum, which is based in Cambridge, Massachusetts. "We're very glad it went through, but also recognize that it's only another step along the path."



Photo courtesy of Clivus Multrum

Foam flush toilets that require only three ounces of water mixed with biodegradable foam per flush are being incorporated into several manufacturers' systems.

TECHNOLOGY SAMPLER

Questions from homeowners and the concerns of regulators have been patiently addressed by manufacturers and researchers over the years. In 1978, NSF developed standards for testing composting toilets for parameters such as structural soundness, liquid containment, odor production, fecal coliform content of the end product, and so on. Today, most commercially available models carry an NSF Listing Mark. Additionally, systems that synergistically combine various complementary technologies are now available. "The mistaken picture some people had of a composting toilet simply being this large empty box with a black hole connecting it from the toilet above is being replaced," says del Porto, whose company is a distributor for several models. "That image is more realistically being replaced by an efficient piece of equipment that provides the optimum environment in temperature, moisture and aeration for the composting of all organic matter. They can be connected by extremely low flush toilets — less than a pint per flush — through a familiar commode in the bathroom, and can be installed by professional plumbers."

The variety of these "unsaturated aerobic units," as del Porto calls them, is illustrated by the following brief descriptions of several commercially available systems.

The Sun-Mar "Ecolet" is a very compact,

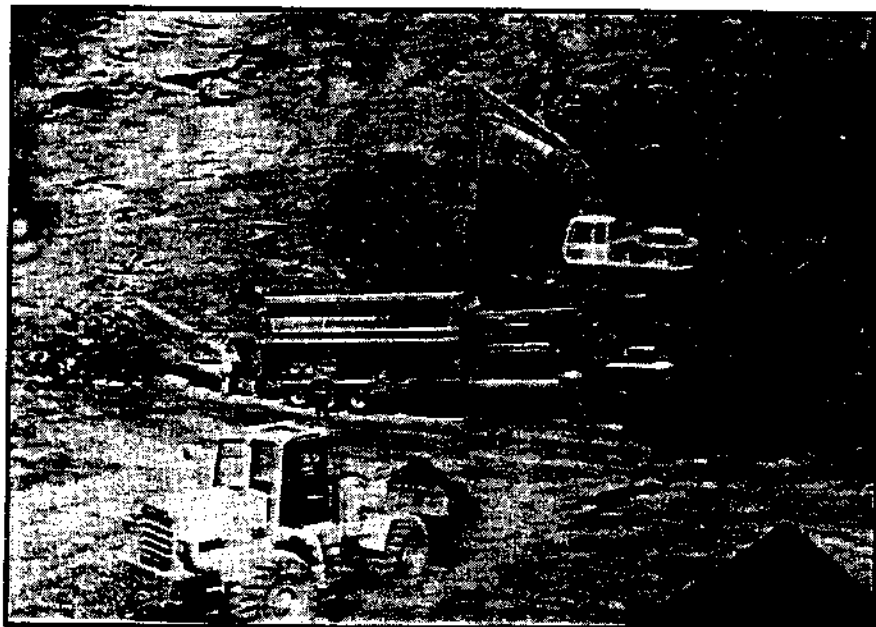
A combination composter and graywater treatment system from AlasCan is designed to handle a household's entire effluent stream, as well as organics from the kitchen garbage disposal.

Photo courtesy of AlasCan



self-contained unit (19.5 inches wide by 23 inches deep by 26 inches high). Constructed of fiberglass or stainless steel, the toilet box holds a rotating drum with three chambers that is turned every third day when in use. Two gallons of peat and a quart of top soil are added before the Ecolet is used, and a cupful of peat added after every bowel movement. A chamber on the floor of the toilet with a three-inch vent stack and fan evaporates any excess liquids. Periodically, the drum is rotated backwards to drop partially processed material into a compost bin-

A RAWSON Model 636 Trommel Screen meets the challenge, even in demolition landfills where the material to be screened can be piled over 100 feet deep.



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WALDEN POND'S COMPOSTING TOILET AND GREYWATER SYSTEM

EVIDENCE of changes taking place in the design of zero discharge composting systems for public toilet facilities can be seen in the installation at Walden Pond in Concord, Massachusetts. This state park hosts around 500,000 visitors each year who come to swim and/or visit the old stomping grounds of Henry David Thoreau. To head off an impending pollution problem stemming from increasing use of old flush toilets upslope from the pond, the park contacted Clivus New England in North Andover, Massachusetts which installed two Clivus Model M35 composters and a greywater plant irrigation system in April, 1994. Human waste from three ceramic foam flush toilet fixtures and one urinal is transported to the composters. Greywater from four sinks and one janitorial mop basin flows into an enclosed three-stage aerobic intermittent sand filter combined with a surge control tank. Solids remain in

the composter for between two to five years. After being treated and polished, greywater is pumped out through drip irrigation tubing underneath an ornamental garden of indigenous plants. The system eliminates all sewage discharge and, with assistance from low flow sink fixtures, dramatically reduces greywater discharge. Based on the successful operation of the restroom, the park installed a smaller Clivus

unit in its visitors' center and administration building in 1995.



Drip irrigation tubing was installed (right) to handle output from the restroom's greywater system (above).



ishing drawer.

On the opposite end of the size scale, Clivus Multum models for public restrooms include sloping composters made of high density, cross-link polyethylene resins, each roughly 8.5 feet long by 6 feet wide, situated beneath a roadside rest stop (for example). Each tank can accommodate two to four toilets and urinals and around

65,000 uses per year. An automatic controller monitors liquid levels, air flow, pump operation and composter usage. A separate tank stores liquid apart from the compost to enhance decomposition and facilitate liquid removal by automatic pump.

The AlasCan Organic Waste and Wastewater Treatment System developed by Clint Elston features a biological and vermiculture processing insulated tank with two motor driven agitators that can be programmed to mix the composting material at precise intervals. If excess liquid accumulates at the bottom of the tank, an automatic self-priming pump and sprinkler system redistributes the liquid evenly over the composting mass. Either ultra low water usage foam or vacuum flushing toilets are used to transport bathroom wastes into the tank. A ceramic bar sink with a conventional garbage disposal also can be built in

to grind and transport kitchen organics to the composter. Another additional feature is that greywater from the bathtub, laundry and kitchen can be drained into an extended aeration wastewater treatment tank. A hand operated sludge pump moves accumul-

ed biosolids into the composting tank for further treatment.

A Washwater Garden, combining the Vera Carousel Composter — a Norwegian model with four separate, rotating composters inside each unit — and a "zero discharge" greenhouse utilizing plants for evapotranspiration is described in the accompanying sidebar/article (see "Composting Toilets Provide Least-Cost Solution For Property Owners," p. 40).

ZERO DISCHARGE SANITATION IN MICRONESIA

SEWAGE pollution and the waste of valuable fresh water resources are growing problems in Pacific islands and developing nations around the world. Over the past few years, The Center for Clean Development (CCD), a project of the nonprofit Tides Foundation, has been working to develop zero discharge sanitation systems appropriate for use in the developing world. In one project on the island of Pohnpei in Micronesia, several demonstration biological toilets have been operating with little or no maintenance for over two years. Made from concrete and locally available materials including discarded fishing nets, each unit is able to handle all of the toilet wastes from a large family of ten, producing valuable compost while evaporating excess liquids.

Based on their success, the national government of the Federated States of Micronesia is building 40 more. A design has also been developed integrating a solar-enhanced Soltran biological toilet and Washwater Garden technology from Sustainable Strategies in Concord, Massachusetts for use in preschool centers in the outer islands of Yap. This allows wastewater from the wash basin and shower, along with excess liquid from the biological toilet to be filtered and drained through a series of pipes into a concrete-sealed garden bed of specially selected plants. Instead of soil, the garden utilizes a six-inch layer of gravel underneath 12 inches of sand. Wastewater is drawn up by the roots of the plants and transpired through the leaves as water vapor, with no hu-

man contact required. The entire system is described in a booklet available from CCD called *The Yap Head Start Nonpolluting Bathroom*.

Founded in 1992 to expand upon work begun by Greenpeace in the Pacific Islands, CCD's mission is to help local communities achieve sustainability by preventing environmental impacts from economic development. According to Dave Rapaport of CCD, the organization's major current effort is the Campaign for Environmentally Sound Sanitation, promoting the use of composting toilets and other zero discharge technologies to international development organizations and domestic health agencies. Contact The Tides Foundation/Center for Clean Development, 1227 W. 10th Ave., Eugene, OR 97402.

MARKET GROWTH

Mike Wilkinson, president of SunMar in Burlington, Ontario, maintains that for the cottage market, in which his company specializes, sales have been consistent for the past 20 years. However, he notes that the company is hearing from an increasing number of people with ailing septic systems. "Maybe they were installed 25 years ago and now are failing," he says. "The owners are discovering that the cost to install a new system or upgrade the old one are not insignificant and they are looking for alternative diversion schemes." Wilkinson also is targeting RV and boat owners with his company's new Ecolet and has gotten an encouraging response so far.

Clint Elston has been approaching a different market segment. During 14 years in Alaska, where his system was developed based on modifications of Clivus technology for colder climates, he received \$275,000 in grants from the U.S. Department of Energy and the Alaska Science and Technology Foundation. Elston sold over 100 units, mostly to military installations and wilderness lodges. In November, 1995 he moved the company back to his home state of Minnesota where, two years previously he had installed an AlasCan in the caretaker's residence at Olmstead County's Chesterwoods Park. It has been so well received that county officials reportedly hope that the system might allow the future development of smaller lot sizes in suburban areas, which now often need two acres or more to support a septic and mound type system.

In addition, Elston has been meeting with officials of the Rural Utility Services organizations, the Minnesota Pollution Control Agency and the Plumbing Board to discuss the possibility of involving interested utility companies with the installation and service of the AlasCan system. "Utilities already have the service infrastructure and we are incorporating a remote type of meter reading technology to determine when the units require attention," Elston points out.

In New England, David del Porto notes that progress in ecosystem design and engineering creates market potential by allowing consumers to purchase whole systems (including a greywater component) for effectively handling a household's effluent. "Engineers and architects have to respond to rising costs, and they are realizing that an ecological approach is a viable option," he says. "The good news is that the type of living machinery that aerobic soil organisms and plants provide can be integrated with toilets and other plumbing fixtures very cost effectively. And when you intentionally design a system that creates no waste in the first place, associated costs just literally melt away."

Overall, there is a cautious optimism about market growth for composting toilets in the near future. "I think it will partly be generated on the public side by people rec-

ognizing the economics of existing systems," says Nolan of Clivus Multrum. Echoing comments made by others in the industry, she also points to product improvement and industry maturity as factors affecting growth. "I think, frankly, that products have developed to the point where they are more 'user ready,'" she says. "Fifteen years ago, our system, and others, weren't really developed to the point of true user friendliness. I know that this is one of the areas Clivus — and our competitors — have worked on. Today the systems generally require less maintenance and the technology is better understood. The market is more ready for us, but we also are more ready for the market."

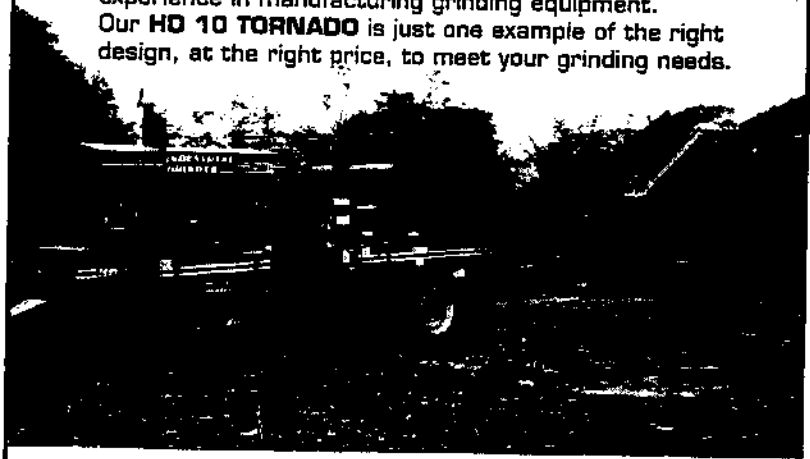
Today the systems generally require less maintenance and the technology is better understood.



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THE PRESS DEMOCRAT, THURSDAY, JULY 11, 1996

NATION

Bacteria called growing threat to nation's water

is becoming wildly different

Once seen as threatening little more than a stomach ache, microscopic waterborne bugs are increasingly turning deadly — forcing health officials to shift priorities as they try to make drinking water safe for a changing population.

For years, the Environmental Protection Agency has focused on potential cancer-causing chemicals as the main drinking water threat.

But now water agencies and federal health officials concede the more immediate concern are waterborne bacteria, parasites and viruses — with names like cryptosporidium and giardia — some of which were largely ignored, or even unknown, until a few years ago.

For the past week, people in the nation's capital have been reluctant to drink their water. Boiling orders were issued, then canceled. Finally, officials poured more chlorine into the system. The reason: signs that the city's aging water pipes are full of bacteria.

The urgency surrounding waterborne pathogens comes because more and more Americans are susceptible to the illnesses they cause, health experts say.

Most of these organisms have been around for eons, but we're just now beginning to detect them," said Dennis Juranek, an expert in parasitic diseases at the Centers for Disease Control and Prevention in Atlanta.

Only when people began reporting severe illnesses and even dying from such bugs did they emerge on health officials' radar screens as important, he said.

In most healthy people, the damage is limited to a brief bout of intestinal discomfort, sometimes even mistaken for the flu. But for those suffering from AIDS or HIV infection, cancer patients and the elderly — whose immune systems cannot ward off bacterial attack — drinking water can become deadly, say health officials.

Some of the emerging pathogens are still mostly a mystery to health experts. Some, like cryptosporidium, aren't stymied by chlorine, the most successful and widely used disinfectant in drinking water.

"It is a serious issue, an emerging threat. We think it needs significant focus," said EPA Administrator Carol Browner. Her agency already has shifted some of its focus in dealing with pollutants and plans a five-year, \$30 million effort to learn more about microbial pollution.

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That's Fit to Print"

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ILLNESS OUTBREAK PUZZLES OFFICIALS

Microbe Elusive as It Navigates
the Nation's Food Supply

By LAWRENCE K. ALTMAN

Federal officials are developing a crash program to test food and other items for an exotic microbe that is known or suspected to have made more than 1,000 people sick in 11 states. Investigators are also shifting the focus of their suspicions from strawberries to raspberries as the source of contamination.

The microbe, known as cyclospora, is a parasite that infects the intestine and can cause intense diarrhea, weight loss and fatigue. It has caused three previous outbreaks of disease in the United States, including one last year in Westchester County, but the ones that started this spring are by far the largest.

The epidemic is yet another in a long line of new and emerging infections like legionnaire's disease and AIDS that have struck this and other countries in recent years.

Despite warnings about such diseases, the current cyclospora outbreak has caught health officials by surprise. They say that parasites are rarely the cause of large food-borne outbreaks and that this is the first major national one in recent years. In an outbreak of cryptosporidiosis in the Milwaukee water supply sickened 400,000 people in 1993.

This country's food supply is considered very safe. But Dr. Stephen I. Ostroff of the Centers for Disease Control and Prevention and other federal officials said that the cyclospora outbreak "highlights the potential vulnerability" of the food supply when a crack appears in the safety walls that protect it.

Even with a crash program, tracking the route by which cyclospora is penetrating the food supply is proving hard because several factors make the parasite elusive.

One is that it takes a week for a person to become sick. Several more

Consumers Told To Wash Fruits

Health departments, where cyclospora has been found, are advising consumers to wash strawberries and other fruits before eating, both because of the outbreak and as a general food safety rule. The Centers for Disease Control and Prevention said that washing fresh fruits and vegetables close to the time of consumption has been the standard health recommendation for many decades. The reason for the recommendation is that the outbreak and because of the possibility of contamination by soil, culture or insecticides.

What health authorities mean by "washing" is removing any contaminants physically in a stream of clean, running, drinking water. Using soap or especially detergents is not recommended, as this could make the fruit more susceptible to contamination. Consuming fruit with a clean vegetable brush can help dislodge soil, but have not documented, that the cyclospora organism stays on the surface of the skin if it is washed. And, although not in the fruit, it may be attached to the fruit. That is true of raspberries, both bacteria and parasites. Nevertheless, produce should be washed even if it is to be eaten. This outbreak is believed to be the first major outbreak in many years of a food-borne parasite as opposed to bacterial, diseases.



A researcher at Cornell Medical Center in New York examines samples of strawberries, a potential source of an illness-causing parasite.

Spores in the outbreak. He hopes to determine whether there is a pattern, and if so, whether it can help develop a test of contamination. The United States Health officials have considered the first case of the World Health Organization, about sending investigators to test water for cyclospora in Latin American countries that export foods to this country. Among the mysteries of the outbreak are why, except for Texas, only states east of the Mississippi River have been affected and why most cases have involved adults.

If berries are the culprit, health officials said they did not know whether the berry was eaten whole or cut after the berry had been eaten. Dr. David Raiman, a researcher at Stanford University who was consulted by the F.D.A., said he planned to use newer techniques to determine the molecular fingerprints of cyclospora.

Illness Outbreak Leaves Puzzles for Officials

many that do are not adequately trained in how to detect it.

Little is known about cyclospora's life cycle, the ways it spreads and how long it takes to become infectious. This means that experts have little idea whether humans are the only hosts. Adding to the complexity of the medical detective work are the delays in recruiting Federal help to investigate the outbreak. The C.D.C. said that health officials only if it means only this week, health departments are sending investigators to Texas and the District of Columbia.

"The outbreaks were ongoing before we were called in," said Bob Brown, director of the C.D.C. If many investigations of disease outbreaks, investigators obtained in the past, agents often turn out to be wrong. Especially, the lack of warning against eating strawberries might have been premature. On Thursday, the Texas Department of Health and Human Services, in a letter to the C.D.C., said it is in the nature of cyclospora. Food epidemiologic investigations. But with cyclospora, the incubation period is about a week, longer than for most food-borne infections. Additional difficulties are that infected individuals are often asymptomatic, laboratory tests are not available, and an accurate diagnosis is made. By then, many people have forgotten what they ate. Yet the food histories are the backbone of the epidemiologic investigations, and they may be less accurate than they

question," said Mary Pandeygast, a top official of the Food and Drug Administration, which has responsibility for safety of products. She said that the Food and Drug Administration had received a letter from the Texas Department of Health and Human Services that it was unreasonable to assume that scientists could develop such tests only three years after identifying cyclospora as a parasite.

Investigation of the outbreaks has been further complicated by the medical diversity of cyclospora. Most doctors lack experience in diagnosing and treating cyclospora. If they have, they often do not. Many laboratories do not test for cyclospora, and

Continued From Page 1

days can pass before cases are reported to public health authorities. That can leave investigators trying to identify contaminated food and trace its source with trails that have often gone cold and memories that have faded.

Public health officials have said they recall eating strawberries but in investigations of other food outbreaks, strawberries have emerged as prime suspects. It is not yet clear whether the disease shifted from one type of berry to the other, or whether it was in raspberries all along. It is not clear how other fruits are involved.

Health officials have not found cyclospora in any raw fruit. It might be that so few microbes are required to infect a person that they escape detection by current techniques. Health officials are trying to run tests that are more sophisticated than the standard ones as polymerase chain reaction, a test that can detect even a single P.C.R. test.

The Food and Drug Administration has asked an laboratories, four of its own, one at the C.D.C. in Atlanta, and another at the California Health Department, to use the P.C.R. test to detect cyclospora on fruit. The tests are being done on berries from implicated restaurants served in homes and restaurants and from random samples collected from stores, distributors and grocers.

Testing began on Thursday. But in the meantime, experts expressed concern that the tests might not be subjected to the rigorous scientific process. They also worry that P.C.R. is such a highly sensitive technology that great care must be

