

# **Pharmaceuticals and the Ecosystem: Keeping the Plant Green through Take Back Programs**

Improper disposal of pharmaceuticals adversely affects the ecosystem. Proposed is a take-back program for New Jersey.

Tag Words: Pharmaceuticals; Ecosystem; Take-Back Program; Landfills; Disposal of Pharmaceuticals;

Authors: Vanessa Hennig-Roshong, Jisoo Kim, Casey Maxwell & Swati Vaghani with Julie M. Fagan, Ph.D.

## **Summary**

Pharmaceutical take-back programs have been established in seven states to prevent the inhospitable side effects that are caused when pharmaceuticals enter the landfills and waterways. To date, New Jersey does not have a state-wide pharmaceutical take-back program that allows citizens to dispose of their unwanted pharmaceuticals in a green manner. Due to improper disposal, an amendment has been proposed that will affirm New Jersey's commitment to a clean ecosystem by removing unwanted pharmaceuticals from the water system and landfills by instituting a state wide pharmaceutical take-back program. This program will allow citizens to properly dispose of their unwanted pharmaceuticals to a licensed pharmacist and controlled substances to a New Jersey law enforcement officer. With the instatement of a state wide pharmaceutical take-back program the citizens of New Jersey will be fulfilling their stewardship of the earth by keeping it clean, healthy and safe.

## The Issue: Pharmaceutical Waste



### Pharmaceuticals Definition

Defined as chemical substances intended for treatment of various diseases

### History

Since the 1950's when the pharmaceutical industry just started, numerous human and veterinary medicines have been developed. Pharmacology, the study of drug action with living organisms, is one of the cornerstones in developing drugs. Oswald Schmiedeberg, the father of modern pharmacology, studied chloroform and "showed that muscraine evoked same effect on the heart as electrical stimulation of vagus nerve".<sup>1</sup>

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Although mass production in medicine has immensely improved the quality of life for many, the industry also caused negative effects on the environment. Intensive research on pharmaceuticals' effect in the environment started about 15 years ago.<sup>2</sup> In February 2009, Swedish scientists found in India near pharmaceutical factories, which produce pharmaceuticals for the western markets, the highest level of pharmaceutical pollution.<sup>3</sup> Currently, no data is available on total worldwide usage of pharmaceuticals because the numbers vary from country to country. Out of a thousand kinds of pharmaceuticals, only a few are considered environmentally important because of the volumes that are consumed or disposed of and how toxic they are to the environment. To date, there is limited information about ecotoxicological effects of pharmaceuticals on wildlife.

### Types of Pharmaceuticals

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There are thousands of different pharmaceuticals that are specialized for specific functions. Six types of drugs, however, account for the majority of consumed pharmaceuticals in the market.

1. *Beta-blockers*: Invented by Sir James Black, the invention is considered as one of the most significant in pharmacology. Used for the management of cardiac arrhythmias and hypertension. They competitively inhibit beta-adrenergic receptors and reduce the effects of physical exertion on the heart.
2. *Cyostatics/Cancer Therapy*: Administered to control cancerous growths and interact with cell proliferation. Methotrexate inhibits folate dehydroreductase enzyme whilst tamoxifen is an antioestrogenic used in breast cancer therapy.
3. *Anti-inflammatory Drugs*: Includes Ibuprofen, Naproxen and Diclofenac. Widely used medication and consequently are often detected in sewage and surface water. Play a range of physiological roles in processes such as inflammation and pain, coagulation and synthesis of protective gastric mucosa and blood flow regulation in kidney.
4. *Steroid Hormones*: Class of organic compounds used in both human and veterinary medicine which include sex hormones. Corticosteroids are used to treat allergic and inflammatory disorders.

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<sup>1</sup> <http://pubs.acs.org/subscribe/journals/mdd/v04/i05/html/05timeline.html>

<sup>2</sup> K. Kummerer; Journal of Environmental Management

<sup>3</sup> <http://southasia.oneworld.net/todayshadlines/drug-companies-accused-of-polluting-water-in-india>

5. *Neuroactive Compounds*: Drugs that interact with the central nervous system including antiepileptic drugs. These drugs increase neuronal activity, stimulants which bind to adenosine receptors.

6. *Antiparasitic Compound*: Control both endo-parasitic and ecto-parasitic organisms.

7. *Blood Lipid Lowering Agents*: Used to decrease concentration of cholesterol and triglycerides in blood plasma.

### Effects of Pharmaceuticals on the Environment

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**Healthy Weaver Fish**

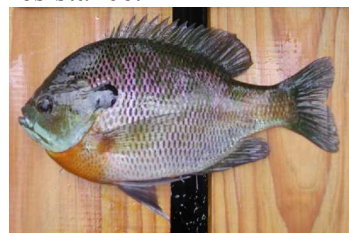


**Cymothoa exigua in Weaverfish**

Excess pharmaceutical ingredients in medications end up entering the environment by disposal of leftover medicines which are flushed down the toilets or grinded in garbage disposals. The chemicals in pharmaceuticals cannot be removed fully by sewage treatment plants and are discharged with treated sewage into waterways. In an investigation completed by Coe and partners, the impact of exposure to the pharmaceutical estrogen, ethinylestradiols, on the reproduction of group-spawning fish was examined. The study showed that there was reduction in the male paternity<sup>4</sup>.

Pharmaceuticals can also affect the behavior of parasite's and their survival mechanisms which in turn can affect the wildlife. Propranolol, a beta-blockade, may significantly reduce the chance of *Dirofilaria immitis* nematode larvae from completing the third stage molting, which leads to a possible significant risk to fish production. As seen from study by Coe *et al*, widespread use of human steroids and contraceptives has had great impact on the aquatic environment. Exposure to the drug had an immunosuppressive reaction which consequently increased susceptibility of fishes to parasite infection<sup>5</sup>.

The consequences of active pharmaceutical ingredients (APIs) in the environment pose contamination to the waterways, can poison wildlife, and aid in the development of anti-biotic resistance.<sup>6</sup>



**Healthy Bluegill**



**Infected Bluegill**

<sup>4</sup> Coe et al: Environmental Science & Technology

<sup>5</sup> N. Morley: Environmental Toxicology and Pharmacology.

<sup>6</sup>C. Daughton & I. Ruhoy: The Afterlife of Drugs and the Role of PharmEcovigilance

## Medication Disposal

### Proper Disposals

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Consumers who do not use all of their over the counter and prescribed medications should take the following steps to dispose of their medication to prevent the contamination of surface waters, ground waters, and biosolids. The presence of pharmaceuticals has been linked to abnormalities and impaired reproductive performance in some aquatic species.<sup>7</sup>

1. To dispose of prescription drugs, that are not labeled to be flushed, you may be able to take advantage of community drug – take back programs or other programs, such as household hazardous waste collection events, that collect medications at a central locations for proper disposal.
2. Call your city or county government’s household trash and recycling services and ask if a drug take-back program is available in the community.<sup>8</sup>
3. In the absence of waste pharmaceutical collection programs, residents are often instructed to flush unwanted pharmaceuticals down toilets or dispose of them in the trash.

### Take-Back Programs

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Residents can bring unused, un-needed or expired medications to any place that is offering a prescription "take back". Customers are encouraged to bring in unused or expired medications for eco-friendly disposal by an FDA-approved company.<sup>9</sup>

### Procedure for Disposal of Medications

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1. Check for approved and local collection programs (certain pharmacies may take unused medications and dispose of them for consumers.)
2. Consult your pharmacist with any questions
3. Do not flush unused medications
4. Do not pour unused medications down a sink or drain
5. Dispose of unused medication in household trash
  - ↳ Pour medication into sealable plastic bag
  - ↳ If medication is a solid, crush it or add water to dissolve the pills.<sup>10</sup>
  - ↳
6. Remove and destroy ALL personal identification information (ex: prescription label) from the medication container. It is against the law to discard controlled substances in the regular trash, and it is against HIPAA and privacy rules, to simply discard medication bottles into the trash with patient information labels still attached to them.<sup>4</sup>



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<sup>7</sup> <http://www.takebacknetwork.com/issues.html>

<sup>8</sup> [http://www.whitehousedrugpolicy.gov/publications/pdf/prescrip\\_disposal.pdf](http://www.whitehousedrugpolicy.gov/publications/pdf/prescrip_disposal.pdf)

<sup>9</sup> <http://www.pharmaca.com/About-us/press/expand-drug-take-back-program-oct-2009>

<sup>10</sup> [http://www.mapharm.com/disposal\\_of\\_medications.htm](http://www.mapharm.com/disposal_of_medications.htm)

- ↳ Destroy personal information
- ↳ Recycle plastic container<sup>4</sup>

### What Can Be Flushed?

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The FDA advises the following medications to be flushed:

- Actiq (fentanyl citrate)
- Daytrana Transdermal Patch (methylphenidate)
- Duragesic Transdermal System (fentanyl)
- OxyContin Tablets (oxycodone)
- Avinza Capsules (morphine sulfate)
- Baraclude Tablets (entecavir)
- Reyataz Capsules (atazanavir sulfate)
- Zerit for Oral Solution (stavudine)
- Meperidine HCl Tablets
- Percocet (oxycodone and acetaminophen)
- Xyrem ( sodium oxybate)
- Fentora (fentanyl buccal tablet)<sup>11</sup>

### Take-back Programs: Acceptable Medications

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- Prescription medicines
- OTC medicines
- Medication samples
- Medications for pets
- Vitamins
- Medicated ointments and/or lotions
- Inhalers
- Liquid medicine<sup>12</sup>

### Take-back Programs: Unacceptable Medications

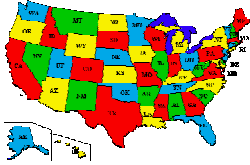
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- Narcotics and/or controlled substances
- Needles and/or syringes and/or lancets
- Thermometer
- IV bags
- Business waste
- Hydrogen peroxide
- Bloody or infectious waste
- Empty containers
- Aerosol cans<sup>6</sup>

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<sup>11</sup> <http://www.smarxtdisposal.net/pdf/SMARxTdisposalPresentation.pdf>

<sup>12</sup> <http://www.medicinereturn.com/return-your-medicines/return-your-medicines/What-to-return/what-to-return>



## Pharmaceuticals, the Law, and Take-back Programs

### Pharmaceuticals: State Laws and Regulations

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Currently the United States does not have any federal regulations on the proper handling of unwanted pharmaceuticals, i.e.: medicines, inhalers, needles, etc. However, while there are no national regulations, many state governments and even a few major cities, have taken it upon themselves to come up with their own legislation in regards to the disposal of the aforementioned pharmaceuticals. All in all there are several different programs that states have developed to ensure that pharmaceuticals are disposed of properly and not hurting both humans and the environment.

### Pharmaceutical Take-back Programs

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The following states either have legislation or pending legislation, which states the guidelines on how pharmaceuticals must be taken back, free of charge, by either a pharmacy, drug retailer, bio-hazard disposal facility or a collection vehicle.

### States with Take-back Program Legislation

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- 1. California-** Each drug retailer must have a drug collection and disposal program. Programs must be free for customers; provide collection location information on drug packaging or purchase orders; and be publicized on signs, written materials, or by direct communication with customers.<sup>13</sup>
- 2. Iowa-** In the year 2007 the Iowa Department of Natural Resources (DNR) was authorized to spend \$225,000.00 for a one year pilot project using options other than landfills and municipal wastewater treatment facilities to dispose of pharmaceuticals. At the moment a new and more permanent program has not been launched.<sup>14</sup>
- 3. Indiana-** Prescription drugs are accepted at some hazardous household waste collection sites.<sup>15</sup>
- 4. New York-** Information is required to be placed at every registered pharmacy or retail business that is authorized to sell pharmaceuticals as to where they may be disposed of later.<sup>16</sup>
- 5. Texas-** Prescription drugs are accepted at all hazardous waste sites, but the site has the right to decide which materials it will accept.<sup>17</sup>

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<sup>13</sup> [Info.sen.ca.gov/cgi-bin/Bill/SB/966](http://Info.sen.ca.gov/cgi-bin/Bill/SB/966)

<sup>14</sup> Iowa Department of Natural Resources (DNR)

<sup>15</sup> [In.gov/legislative/bills/2005/HB/HB1098.1](http://In.gov/legislative/bills/2005/HB/HB1098.1)

<sup>16</sup> New York State Department of Environmental Conservation

<sup>17</sup> Texas Commission on Environmental Ecology

**6. Washington-** Currently there are 33 recycling drop-off sites and buy back sites where unwanted pharmaceuticals can go. At the moment more sites are being checked and added to the list.<sup>18</sup>

**7. Wisconsin-** For each county, municipal and regional planning commission program, The Department of Trade and Agriculture, Trade and Consumer Protection makes grants for residents unwanted prescription drugs. Each year a certain amount of money is allocated. 2009: \$100,000.00<sup>19</sup>

### Drug Donation Programs

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The following states have a drug donation program which allows only unused medications to be taken back to a hospital, pharmacy, manufacturer or distributor for redistribution. Each program differs from state to state, with some only taking back cancer drugs and others after a certain time period.

### States Where Drug Donation Programs Take Place

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**1. Arizona-** The State Board of Pharmacy supervises a prescription drug donation program. Donated medications are dispensed, by prescription, directly to or through participating public or private nonprofit entities, to state residents meeting standards set by the board.<sup>20</sup>

**2. California-** Only pharmacies that are county-owned or have a specific contract with a county can dispense medication. These are established by individual counties on a needed basis. Expired medications are not accepted.<sup>21</sup>

**3. Florida-** Only cancer drugs and supplies that have been kept in “closed drug delivery systems” can be donated to hospital pharmacies. Medicaid drugs are also accepted but must be credited to Medicaid and not donated.<sup>22</sup>

**4. Georgia-** The State Board of Pharmacy, Department of Human Resources, and Department of Community Health allows residents of medical facilities or their guardians to donate unused prescription drugs, which are then given to medically indigent persons.<sup>23</sup>

**5. Indiana-** The Department of Public Health and Board of Pharmacy are authorized to have a program allowing a person to donate drugs and supplies for use by persons who meet eligibility criteria.<sup>24</sup>

**6. Iowa-** A resident or consultant pharmacist in a medical facility may return sealed, unopened medications in individually packaged units to the distributing pharmacy. The buyers are then credited and the medications are restocked and redistributed.<sup>25</sup>

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<sup>18</sup> Washington Department of Ecology, “Search for Recycling in Your Neighborhood”

<sup>19</sup> Wisconsin State Ann, sec. 93.57.

<sup>20</sup> Ariz. Rev. State. Ann., subsec. 150200

<sup>21</sup> Cal. Health & Safety Code, subsec. 150204(i)

<sup>22</sup> Fla. Stat. Ann., subsec. 499.029(4)

<sup>23</sup> Ga. Code, subsec. 26-4-192(a) and sec. 26-4-193.

<sup>24</sup> Ind. Code, sec. 25-26-20-4

<sup>25</sup> Iowa Code Ann., sec. 135M.3, subd. 1.

**7. Massachusetts-** The Board of Pharmacy administers a program to accept donations of only cancer drugs and supplies. These donated drugs and supplies are available to any state resident with cancer.<sup>26</sup>

**8. Michigan-** The Prescription Drug Repository Program accepts and dispenses donated prescription drugs to eligible residents. These donated drugs are allowed to be distributed outside of the states lines.<sup>27</sup>

**9. Missouri-** A resident or consultant pharmacist in a residential medical facility may return unused medication to the pharmacy where the medication was bought. The buyer must receive either store credit or be reimbursed.<sup>28</sup>

**10. New York-**The State Board of Pharmacy can establish a drug repository program to accept donated prescription drugs and dispense them to eligible persons. Donations can be made by anyone and must be made to those participating in the program i.e.: pharmacies, hospitals and non-profit clinics.<sup>29</sup>

**11. Pennsylvania-** The State Board of Pharmacy is required to implement a Cancer Drug Repository Program in which approved pharmacies may re-dispense unused cancer drugs to needy cancer patients. Drugs must be 6 months over expiration.<sup>30</sup>

**12. Texas-** Only a pharmacist at a medical facility or a medical professional can return only approved drugs. They must require refrigeration, is less then 120 days after expiration date and must not be controlled substances.<sup>31</sup>

**13. Virginia-** A nursing home or hospital may transfer drugs to a pharmacy that has volunteered in the re-dispense program, to re-dispense to patients free of charge. Poor patients come first.<sup>32</sup>

**14. Washington-**Prescription drugs returned to a pharmacy serving primarily state prisoners may be dispensed to any patient in a state prison, if they were returned in their original container and never in the procession of patients before being returned.<sup>33</sup>

### The Rx for Medical Waste: Reduce, Reuse, and Recycle

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Each year hospitals create 2 million tons of medical waste. Landfills across the United States are becoming home to medical waste and when medical waste is not disposed of properly the ecosystem is harmed. As society has become technologically advanced so did the disposal of medical waste. Many medical waste facilities are tuning their leaching ashy landfills into energy by changing the way they dispose of medical waste.

### Five Techniques of Eco-friendly Medical Waste Disposal

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1. Incineration is used to burn pathological and chemotherapy wastes.<sup>34</sup>

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<sup>26</sup> Mass. Gen. Laws, ch. 111, sec. 251.

<sup>27</sup> Mich. Comp. Laws, subsec. 333.17780 (3)

<sup>28</sup> Mo. Rev. Stat., secs. 196.970 to 196.984

<sup>29</sup> N.Y. Pub. Health Law, sec. 2803-e.

<sup>30</sup> Ohio. Rev. Code, secs. 3715.87 to 3715.99.

<sup>31</sup> Pa. Stat., tit. 62, sec. 2923.

<sup>32</sup> Va. Code. Ann., sec. 54.1-3411.1.

<sup>33</sup> Wis. Stat., subsec. 450.09(7m).



2. Autoclaving uses constant steam pressure to heat the medical waste. The waste is processed for 30-40 minutes under steam pressure of 80 PSI (approximately) at 300+ degrees. The result of the process produces non-infectious medical waste.<sup>35</sup>
3. Electro-Thermal Deactivation (ETD) is a process that employs a dielectric oven where low frequency radio waves are used to generate a high strength electrical field. Pathogens are killed by the heat and the waste becomes non-infectious.<sup>36</sup>
4. Plasma Enhanced MelterB. (PEM) feeds waste materials into a closed chamber where they are superheated to temperatures of between 10,000 and 20,000 degrees Fahrenheit using an electricity-conducting gas called plasma. The intense heat of the PEM rearranges the molecular structure of the waste, transforming organic materials into an ultra-clean, synthesis gas called syngas.<sup>37</sup>
5. The waste to energy process uses two techniques. One is to use the high temperature thermal processes, which thermally oxidize all types of medical waste.<sup>38</sup> The other process is to disinfect and reduce as much clinical waste as possible by heating the medical waste in a burner.<sup>39</sup>

### Pharmaceuticals and the 3R's

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Six leading medical waste facilities are taking strides to offset greenhouse gases, protect the ecosystem, and reduce medical waste in landfills by using one of the five eco-friendly medical waste disposal techniques. They are doing that by properly disposing of medical waste and turning that waste into energy. All six companies want to put in medical waste and output clean energy that will not pollute the air with harmful substances. Some are even moving beyond transferring waste to energy and are producing recycled goods, such as fuel and plastics, to help the planet stay clean and green.

### Transferring Waste to Energy: The Six Power Houses

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1. For twenty years, Covanta Energy has processed medical waste through the process of incineration. Covanta Energy has processed 19 million tons of municipal solid waste each year, which includes medical waste. It has conserved 25,000,000 cubic yards of landfill space and has generated 8,250,000-megawatt hours of electricity, which is comparable to burning 3.5 million tons of coal.<sup>40</sup>
2. Capital Returns Inc., a Milwaukee based corporation, incinerates medical waste. Capital Returns Inc. has created 2 million kilowatt hours of electricity, which is able to provide light for 220 homes for a year.<sup>41</sup>

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<sup>34</sup> <http://www.covantaholding.com/>

<sup>35</sup> [http://dioxin.abag.ca.gov/pilot\\_projs/MW\\_FAQ.pdf](http://dioxin.abag.ca.gov/pilot_projs/MW_FAQ.pdf)

<sup>36</sup> <http://www.stericycle.com/>

<sup>37</sup> <http://www.s4energysolutions.com/index.html>

<sup>38</sup> <http://www.curtisbayenergy.com/private/ca-overview.html>

<sup>39</sup> <http://www.memagazine.org/backissues/membersonly/sept00/features/rx/rx.html>

<sup>40</sup> <http://www.covantaholding.com/site/solutions/environmental.html>

<sup>41</sup> Herald Tribune 2007

3. S4 energy uses the PEM process by taking waste and transforming it into syngas. The syngas can then be transformed into energy products. The energy products are sold to S4 customers or the community in which the S4 plant is located.<sup>42</sup>
4. In 2005, the Spokane Washington Waste to Energy Program produced 178,017 megawatt hours of electricity from 277,196 tons of burned waste. They are also able to use the energy they produced to run their facilities. Additionally, they have signed a twenty year power purchase agreement with multiple power and energy operations in Washington.<sup>43</sup>
5. Stericycle, the largest waste management corporation, provides hospitals with incinerators to dispose of medial waste. From these incinerators steam is produced and turned into electricity. The electricity is then used as a fuel source to power the waste to energy generators.<sup>44</sup>
6. Using green technology, Curtis Bay Energy, located in Baltimore Maryland, thematically oxidizes medical waste and turns it into steam which is then used to generate energy.<sup>45</sup> This energy is sent to a power grid which is used at Curtis Bay or sold to neighboring businesses<sup>46</sup>. Curtis Bay Energy is currently undergoing a project in which they are creating enough energy to generate electricity to run a commercial laundry facility which would include high efficiency washers, dryers, and processing equipment.<sup>47</sup>

### Medical Waste and Plastics: The New Green Recycling

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1. Stericycle has a recycling program with medical facilities (hospitals, doctors/dental offices) that recycles anesthetic containers. These containers are collected by a Stericycle Bio System technician who delivers the containers to a Stericycle facility. Once delivered the medical waste is properly disposed of and the containers are then disinfected, inspected and sent back to the medical facility it came from. Stericycle will also melt the anesthetic containers and produce new ones from the disinfected melted plastic.<sup>48</sup> As of November 17, 2009 they have recycled 73.9 million containers.
2. S4 takes the syngas produced from the medical waste and uses it to make transportation fuels, such as ethanol, methanol and diesel. It also produces industrial materials, such as roofing tiles, insulating panels, and metals from the chemicals that are produce from the syngas.<sup>49</sup>
3. Curtis Bay Energy participates in a recycling program which uses reusable medical waste containers. Curtis Bay Energy receives medical waste in both reusable containers and disposable shipping containers. The waste received in the reusable shipping containers is emptied into the waste-to-energy hoppers. These containers are then disinfected and washed before they are

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<sup>42</sup> <http://www.s4energysolutions.com/index.html>

<sup>43</sup> <http://www.solidwaste.org/sub009c.asp?id=4839>

<sup>44</sup> <http://www.stericycle.com/srcl-the-environment.html>

<sup>45</sup> <http://www.curtisbayenergy.com/process.html>

<sup>46</sup> Curtis Bay Energy Medical Waste In: Clean Energy Out Booklet

<sup>47</sup> Steven W. Groenke, Curtis Bay Energy Representative

<sup>48</sup> <http://www.medwatchtoday.com/1474.htm>

<sup>49</sup> <http://www.inentec.com/pemtm-technology/process-details.html>

returned to customers.<sup>50</sup> Currently, Curtis Bay Energy is researching a technique to capture mercury emissions and allow the mercury to be recycled and used for industrial purposes.<sup>51</sup>

## **The Service Project**

### What We Can Do To Help

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In order to help prevent pharmaceuticals from being improperly disposed off, our group has decided to write a letter to Senator Menendez informing him that the state of New Jersey should put into act an amendment for New Jersey Comprehensive Regulated Medical Waste Management Act, N.J.S.A. 13:1E-48.1 et seq and N.J.A.C. 7:26-3A.1. This amendment will affirm New Jersey's commitment to a clean ecosystem by removing unwanted pharmaceuticals from the water system and landfills by instating a state wide pharmaceutical take-back program. This program will allow citizens to properly dispose of their unwanted pharmaceuticals. Citizens of New Jersey will have the opportunity to bring back their unwanted pharmaceuticals to a licensed pharmacists and controlled substances to a New Jersey law enforcement officer. With the instatement of a state wide pharmaceutical take-back program the citizens of New Jersey will be fulfilling their stewardship of the earth by keeping it clean, healthy and safe.

### The Letter

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The letter to Senator Menendez will include an outline of the current issue and why we are contacting him. Attached to the letter will be the amendment, stating that New Jersey should instate a state wide pharmaceutical take-back program, which will include the following parts: purpose, construction, severability, definitions, and rules/guidelines. Additionally, included in this package will be a statement informing Senator Menendez about the adverse effects pharmaceuticals inflict on the ecosystem when they are not properly disposed of by citizens.

### Editorials

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The letters to the editors will be sent to four different newspapers and magazines. The letters include the issue we are trying to address, problems with the current take-back programs in New Jersey and also the affects that these problems are having on our ecosystem.

November 7<sup>th</sup>, 2009

Senator Robert Menendez

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<sup>50</sup> <http://www.curtisbayenergy.com/private/ca-overview.html>

<sup>51</sup> Curtis Bay Energy Medical Waste In: Clean Energy Out Booklet

1 Gateway Center, Suite 1100  
Newark, NJ 07102

Dear Senator Menendez,

We are students of Rutgers University currently enrolled in Dr. Julie Fagan's Animals and Agriculture's Class, investigating emerging "pharmaceuticals and the ecosystems". Through our research we have found that the citizens of New Jersey do not know how to properly dispose of unwanted pharmaceuticals. Due to the lack of knowledge, unwanted pharmaceuticals are being improperly disposed; thus affecting the water system and our living environment. These pharmaceuticals have the potential to harm humans, animals and marine life.

Current regulations for the disposal of unwanted pharmaceuticals only apply to pharmacies, doctor's offices, hospitals, drug companies and home self care facilities. Since the New Jersey Comprehensive Regulated Medical Waste Management Act, *N.J.S.A. 13:1E-48.1 et seq.* does not pertain to the citizens of New Jersey, we are proposing an amendment to the current bill, which will require pharmacies and medical facilities to accept unwanted pharmaceuticals and medical waste from the New Jersey citizens.

We hope that after reading our proposal you will take into consideration this amendment to the New Jersey Comprehensive Regulated Medical Waste Management Act, *N.J.S.A. 13:1E-48.1 et seq.*

Your interest in this matter will be very much appreciated. Please direct all of your correspondence to our professor, Dr. Julie Fagan. [Fagan@rutgers.edu](mailto:Fagan@rutgers.edu). (732) 932-8354

Thank you for your time and consideration.

Sincerely,

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Vanessa Hennig-Roshong  
Jisoo Kim  
Casey Maxwell  
Swati Vaghani  
Julie M. Fagan, Ph.D (Faculty advisor)

Amendment to New Jersey Comprehensive Regulated Medical Waste Management Act,  
N.J.S.A. 13:1E-48.1 et seq and N.J.A.C. 7:26-3A.1

A. Purpose, scope and applicability

(a) the purpose of this amendment is to establish a take-back program in the state of New Jersey which will allow citizens to dispose of unwanted and expired pharmaceuticals pursuant to the New Jersey Comprehensive Regulated Medical Waste Management Act, *N.J.S.A. 13:1E-48.1 et seq* and *N.J.A.C. 7:26-3A.1*.

(b) The rules in this subchapter will apply to regulated medical waste as defined at *N.J.A.C. 7:26-3A.6*. that is generated, stored, collected, transferred, disposed of or otherwise managed in the state of New Jersey.

(c) Generators, collection facilities, and citizens of New Jersey that generate, store, collect, and dispose of pharmaceuticals and medical waste in New Jersey shall comply with this amendment and the pursuant act that has been established.

(d) In addition to the requirements of this subchapter, all applicable requirements of the Department of Health shall be met.

(e) In addition to the requirements of this subchapter, generators, collection facilities shall comply with all applicable Federal, State, county and local statutes, rules and ordinances.

#### B. Construction

This subchapter shall be liberally construed to permit the Department to implement its statutory duties in which they find fit.

#### C. Severability

If any section of this amendment or the application thereof to any person in the state of New Jersey, is regard as being unconstitutional or unsound by a court of competent jurisdiction, the remainder of this amendment shall not be affected thereby.

#### D. Definitions

“Consumer” means an individual who purchases or owns pharmaceuticals.

“Controlled Substances” means any drug or substance that is regulated by the Drug Enforcement Administration.

“Direct Communication” means communication that is done between the pharmacist and consumer or the law enforcement officer and consumer.

“Generators” means any person or site which produces medical waste.

“Law Enforcement” means any person who is employed by the local, state or federal government that enforces the law and keeps the peace.

“Medical Facilities” means any facility that is a hospital and or clinic that provides medical treatment to the community.

“Medical Waste” means any solid waste that is generated to treat a medical condition.

“Original Container” means the container in which the pharmaceutical was sold, distributed, or dispensed in.

“Persons” means any citizen of the State of New Jersey.

“Pharmaceuticals” means drugs, devices, syringes, needles or any other objects used for injecting drugs, medicines, or items of personal hygiene.

“Pharmacies” means that any retail shop where medication and pharmaceutical items are sold.

“Store Credit” means credit given for another item located in a pharmacy.

“Tampered” means any original container that the pharmaceutical came in is destroyed, not allowing the pharmacists to be able to determine the pharmaceutical within the container.

“Written Document” means a document that is handwritten or typed informing consumers about New Jersey take-back programs.

#### E. Rules and Compliance Guidelines

(a) The state of New Jersey will establish a pharmaceutical and medical waste take back program.

(b) All pharmacies must make it known to consumers that they accept pharmaceuticals and medical waste.

a. A notice will be posted at the pharmacy counter making it known to all customers that a take-back program exists.

(c) All pharmacies must list which pharmaceuticals and medical waste they accept.

a. A written document must be presented to the consumer at the time of pick-up and/or delivery.

b. Have a direct communication with the consumer at the time of pick-up and/or delivery.

(d) Pharmacists must accept unwanted pharmaceuticals and medical waste from consumers.

(e) Pharmacies must make it known to customers that controlled substances defined by the FDA must be brought to law enforcement offices.

a. A written document must be presented to the consumer at the time of pick-up and/or delivery.

b. A sign will be posted next to the pharmacy counting stating that controlled substances must be brought back to law enforcement officials.

(f) That pharmacist or law enforcement officer will not impose a charge to accept pharmaceuticals and medical waste from consumers.

(g) Medication returned to pharmacies or law enforcement offices, must be in their original containers.

(h) The pharmacist and law enforcement officer have the right to refuse pharmaceuticals and medical waste from consumers that is not in its original container or appears to be tampered with.

(i) Any pharmaceuticals or medical waste that is returned by consumers cannot be resold or redistributed.

(j) No unwanted pharmaceuticals can be returned to a pharmacist for store credit or money.

(k) Law enforcement officers should dispose of pharmaceuticals and medical waste in accordance with Federal Regulations.

(l) Pharmacists should dispose of pharmaceuticals and medical waste as described in Title New Jersey Comprehensive Regulated Medical Waste Management Act, N.J.S.A. 13:1E-48.1 et seq.

(m) If the above information is not abided or listed in pharmacies a fine of \$1,325.00 and/or imprisonment (for not more than six months at the county jail) will be implemented, if convicted.

## Statement

Since the mass production of pharmaceuticals since early 1950's, quality of life has significantly improved. Due to massive consumption of pharmaceuticals; pharmaceutical waste has been polluting the environment, in addition to plaguing our water system. It has been only 15 years since the awareness on effects of pharmaceutical wastes was raised and fervent research is still being done to find solutions to the problem. Pharmaceutical waste can alter the chemical makeup of marine wildlife in addition to parasites' behaviors which can have an impact on reproduction and biochemical processes of wildlife. Due to the enormous effects that pharmaceutical waste can have on the environment, current drug disposal regulations need to be stricter and take-back programs need to be established and reinforced.

Excess pharmaceutical ingredients in medications enter the environment through the disposal of leftover pharmaceuticals. These pharmaceuticals are either flushed down the toilet or grinded in garbage disposals. The chemicals in pharmaceuticals cannot be removed fully by sewage treatment plants and are discharged with treated sewage into waterways. There are several types of pharmaceuticals in the market, beta-blockers, anti-inflammatory drugs, cytostatics, and steroid hormone, which have significant implications on the environment, marine wildlife and animals. Through the implementation of take-back programs pharmaceutical waste contaminating the environment will diminish.

Based on the current research, it is critical that expired and unwanted pharmaceuticals should be collected and recycled by methods of safe disposal. Drug donation programs are instituted in 14 states in the country. Neighboring states such as New York and Pennsylvania have drug repository programs where unwanted drugs can be donated. Currently there are no take-back programs in pharmacies or pharmacy stores such as CVS or Walgreens in New Jersey. Therefore, carefully designed pharmaceutical take-back programs need to be put into practice in order to save the environment from being polluted by the waste.

## Editorials

### What in your Medicine Cabinet is Causing you Harm?

By: Vanessa Hennig-Roshong, School of Environmental and Biological Sciences, Douglass College, Rutgers College 2011

Do you know what is in your medicine cabinet? I am sure many American's do not and I am positive that many do not realize how many pharmaceuticals (medications, inhalers, sharps, epipens), expired or unused, are housed in medicine cabinets. Moreover, I am sure that many American's do not know what to do once they take inventory of their medicine cabinet's and decide what to keep and what to toss. The old idea of tossing unwanted medications down the toilet has been left in the past and the new idea of, wait, what is the new idea, what do I do with my unused or expired medication, is thought of.

The effect of tossing old medications down the toilet has expired due to the Clean Water Act. After years of this practice, side effects were noticed in marine wildlife, where the pharmaceuticals were interacting with the hormones of the fish, thus changing the composition of the fish. It was also discovered that trace deposits of pharmaceuticals are found in our



drinking water and studies are being done to see how these pharmaceuticals can affect the human body. Due to these findings, the FDA produced new guidelines on how to dispose of pharmaceuticals. These guidelines state to flush controlled substances down the toilet, but to dispose of all other medications by placing them into a plastic sealable bag; adding kitty litter or coffee grounds to disguise the pills, and place the bag in the garbage. Though this method prevents harm to humans and marine wildlife, other wildlife and animals such as stray dogs and cats, can still be affected by digging through the garbage that is disposed of and ingesting these medications. Not only is that harmful, but what are citizens suppose to do with their unwanted sharps (epi-pens, needles) and inhalers? You cannot just toss these into the garbage like it is food.

So, what is the best practice of ridding oneself of pharmaceuticals? The answer is take-back programs. Take-back programs allow consumers to bring back unwanted pharmaceuticals, including sharps, inhalers and chemotherapy drugs, free of charge. Additionally, pharmacists have first hand knowledge on how to dispose of controlled substances. This method is not only cost effective but it helps protect the environment and prevents humans from drinking someone else's medications. More importantly, pharmaceuticals can provide energy. Yes, you read that right! Certain take-back programs deposit their pharmaceuticals to handlers who create energy from pharmaceuticals in different ways. After the pharmaceutical is destroyed, energy is outputted and used to power the medical waste factories, local houses, and other companies who have bought energy from the medical waste disposals companies. Sadly, only seven states have take-back programs and New Jersey is not one of them.

I am asking you, citizens of the Tri-Boro, to take action and change your process of disposing of pharmaceuticals. Firstly, stop flushing medications down the toilet. Secondly, get out a pen and paper or hit the power switch on your computer and write to your senators and local congressmen. Tell them you want take-back programs in New Jersey. Tell them you want to go green, help the wildlife. Mostly importantly, tell them you want to be a good steward of the earth and keep Mother Earth clean and healthy; so our children have a place where they can grow and prosper without the fear of the Earth dying on them. Fight for your rights and say yes to take-back programs!

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**By: Jisoo Kim**

As the Nov.3 gubernatorial election approaches, New Jersey is preparing for another term of Jon Corzine or a new governor. Both candidates have been criticized much of the time by avoiding to talk about important issues, and sure enough they did not talk much about environmental issues either. New Jersey is one of leading states in producing pharmaceutical wastes because of many populated companies in the state. However, there is no effort to implement any sort of laws or programs to reduce pharmaceutical wastes in New Jersey. Neighboring states such as New York and Pennsylvania have take back programs in which people would drop off their unwanted or unused pharmaceutical products in pharmacies. Studies showed that pharmaceutical wastes could disrupt an ecosystem by driving certain species to go extinct. Increased awareness on pharmaceutical pollution must be raised in New Jersey, since there are many companies who produce pharmaceutical products. Whether the winner of the election is Jon Corzine, Chris Christie or Chris Daggett, the newly elected governor must act fast on reducing pharmaceutical wastes in New Jersey in order to protect the environment.

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ATT: Letters to the Editor  
The Newark Star Ledger  
1 Star Ledger Plaza  
Newark, NJ 07102

To Whom it may Concern:

Presently one of the biggest not talked about problems in the United States is the improper disposal of pharmaceuticals into our water supply. Each and every day citizens, hospitals and pharmaceutical companies alike dispose of their unwanted pharmaceuticals do not the fact that they either don't know any better or they have nowhere else to dispose of them. Most unwanted medications are disposed of by flushing expired drugs down the toilet and also disposed into water by large scale industries. These contaminants in water have serious effects on humans and the ecosystem that we live in.

At the moment New Jersey, the leading state for pharmaceutical production in the United States, is without legislation that would make it mandatory for their be places for citizens of the state to dispose of their unwanted pharmaceuticals. A bill passed in 1989 ensures that pharmaceutical companies and other large corporations disposes of their unwanted pharmaceuticals, but conveniently citizens were left out. We must take the necessary action to get the word out that a bill must be put in place, so that we can stop damaging our fragile ecosystems.

Sincerely,  
Casey Maxwell  
Rutgers the State University of New Jersey

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Dear Editor,

What happens when one flushes medication down the toilet or throws it out? Nothing was the answer for many decades when there was no technology to figure out the effects it had on the environment and the people. But now with the help of technology we are able to find out the harm that is being done to the environment everyday. Over 250 million pounds of pharmaceuticals have been disposed in the US annually. Researches have been able to find traces of pharmaceuticals such as prescription and non-prescription drugs, cancer treatments, pain killers, birth control pills, etc. which disrupt the hormone and endocrine systems. Not only are the humans being affected but the aquatic life is at risk as well. Selenium, heavy metals, etc. that are found in some drugs often alter the reproduction system of the aquatic life as well as causing mutations and alterations in feeding system. These here are only of couple of examples on how the aquatic life is being harmed.

So how do we stop this? The people should stop flushing or throwing unwanted medications out and instead give them back to the pharmacies. The pharmacies should inform the people about the take back program they have. This will allow the citizens to know they are able to give their unwanted medications to the pharmacy. Since only a number of pharmacies are doing this, if it is put into law, then we will reduce the amount of medications being disposed the harmful way.

Please help us get the word out to propose a law stating how pharmacies should have take-back programs, so we as a whole can make a change for the present and the future.

Sincerely,  
Swati Vaghani

## Appendices

### **Pharmaceuticals and the Ecosystem**

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#### **IV. Medical Waste- Vanessa Hennig-Roshong**

- 1. The Rx for Medical Waste: Reduce, Reuse and Recycle**
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#### **V. What We Can Do To Help- Vanessa, Jisoo, Casey & Swati**

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