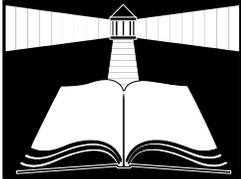


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DHS Chemicals of Interest List

By Muhammad Hanif and Abdul Khalid, HTIS

The Department of Homeland Security (DHS) has finalized the Chemicals of Interest (COI) list included as Appendix A to the Chemical Facility Anti-Terrorism Standards (CFATS) rules at 6 CFR Part 27. The Appendix A final rule to the CFATS, was published on November 20, 2007, in Federal Register Vol. 72, No. 223, pages 65395 to 65435 (72FR65395) and can be accessed at <http://www.dhs.gov site>. Appendix A is essentially a list of chemicals that, if stolen, could be turned into a weapon, or, if released near populated areas, could potentially harm or kill hundreds or thousands of people.

The Appendix A chemicals have been

divided into the following three categories:

- Release Hazard Chemicals - those chemicals posing a danger for human life or health if released, including toxic inhalation hazards, flammables, and explosives,
- Sabotage Chemicals - those chemicals that require some chemical reaction to pose some danger, chemicals that, if mixed with other readily available materials, have the potential to create significant adverse consequences for human life or health, and
- Theft and Diversion Chemicals - those chemicals that are used to create

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chemical weapons (CW), explosives, or weapons of mass effect (WME). For theft/diversion chemicals, facilities need only count those chemicals in transportation packagings when determining screening threshold quantities.

DHS no longer requires the screening threshold quantity (STQ) for “any amount”. For preliminary screening, each chemical on the COI list now has a specific STQ based on the potential hazard and significant human life or health consequences associated with the chemical. The Department has established baseline STQs for the chemicals of interest for each security issue. DHS discussed the baselines in preamble and also summarized the general rules in Table 1: “Summary of General Rules by Security Issue” at the Appendix A final rule of November 20, 2007. Also, certain chemicals will have mixtures and counting calculations associated with the chemical for each security issue. For example, propane that is a release hazard chemical has a STQ of 60,000

pounds, but containers holding 10,000 pounds or less will not be counted for the threshold quantity. DHS believes these levels for propane will exclude from regulation the majority of farm operations and nonindustrial end-users, but include distribution facilities and major farm operations.

In the final rule making, the STQ for chlorine is another significant change. There are two security issues (release-toxic, and theft/diversion-WME) associated with chlorine, each with its own STQ. For facilities housing chlorine in which there is a risk of theft, the STQ is 500 pounds, representing no more than five 100-pound containers. For facilities where there is a release hazard risk, the threshold quantity is 2,500 pounds and facilities are required to use the calculation and mixtures provisions that apply to all other release-toxic chemicals and codified in Title 6 CFR parts 27.203(b)(1)(i)-(ii) and 27.204(a)(1).

The last major change noted by DHS involves urea and acetone, both of which are removed from the COI list in Appendix A. The rationale is that these chemicals must be mixed with other

chemicals, which remain on the list, to pose a hazard. The DHS felt comfortable with removing urea and acetone if the other chemicals remained subject to the rule.

Appendix A lists approximately 300 chemicals of interest and includes common industrial chemicals such as chlorine, propane and anhydrous ammonia as well as specialty chemicals such as arsine and phosphorus trichloride. Any facility that possesses (or later comes into possession of) chemicals of interest in quantities that meet or exceed the STQ for any applicable security issue must complete and submit a Chemical Security Assessment Tool (CSAT) “Top-Screen” within 60 calendar days of the publication of Appendix A, or January 22, 2008. If a facility later comes into possession of a COI at or above the noted STQ, it will have 60 calendar days from that date to fill out the Top-Screen.

The information from the Top-Screen will make preliminary determinations as to which facilities present “a high level of risk” - the facilities that Congress authorized DHS to regulate. Facilities determined to be high risk

will have to conduct vulnerability assessments, and, based upon the risk the facility presents, develop and implement a site security plan that meets DHS's performance standards.

DHS has worked closely with the chemical industry as well as state and local authorities on strengthening security at chemical facilities throughout the country. While many chemical facilities have already initiated voluntary security programs and made significant investments to improve security, gaps remain. The CFATS regulation imposes for the first time comprehensive federal security regulations for high-risk chemical facilities. The CFATS regulation, published on April 9, 2007, in Federal Register Vol. 72, No. 67, pages 17687-17745, is already being implemented at certain high risk chemical facilities across the nation.

For additional information and/or to discuss a specific situation, please contact Marybeth Kelliher, Chemical Security Compliance Division, Department of Homeland Security, Washington DC, 20528, at 703-235-5263.

References: 1. Federal Register (FR)/ Vol. 72,

No. 233/ Tuesday, November 20, 2007, pages 65395 to 65435 (72FR65395).

2. Homeland Security Leadership Journal, November 20, 2007, Chemical Security: Publication of the list of Chemical of Interest, <http://www.dhs.gov/journal/leadership/2007/11/chemical-security-publication-of-list.html>

New Fuel Blend Hazmat Shipping Names Authorized by DOT

By Tom McCarley, Chemist, HTIS

On January 28, 2008, the Department of Transportation issued a final rule with a number of amendment changes to the hazardous materials shipping regulations at 49 CFR 100-185. The amended rule becomes effective October 1, 2008 but in some cases, two phase-ins up to October 1, 2010 are allowed for new fuel blend ID numbers that are pre-marked on cargo containers. Compliance with the new regulations is voluntary as of January 28, 2008 and mandatory on October 1, 2008 with several phase-in exceptions as noted.

One of the major changes is to add several new authorized proper shipping names and ID numbers for fuel blends, especially those gasoline-alcohol blends that are becoming increasingly popular in an energy hungry world. Some of the new ID numbers are domestic only 'NAxxxx' numbers, whereas others are universal 'UNxxxx' identification numbers.

Some of the new hazmat descriptions for gasoline with not more than 10% ethanol are:

- Gasohol, NA1203 (w/ not more than 10% ethanol).
- Gasoline UN1203 (w/ not more than 10% ethanol).
- For gasoline with not more than 20% ethanol, use
- Ethanol and gasoline mixture, UN3475 (w/ more than 10% ethanol).

For gasoline/ethanol blends with more than 10% ethanol, the following names are to be used:

- Ethanol and gasoline mixture, UN3475.

For the fuel blend known as E85 (85% Ethanol and 15% gasoline), use

- Ethanol and gasoline mixture, UN3475.

For alcohol mixtures containing up to 5% gasoline, the following names are acceptable:

- Alcohols, n.o.s., UN1987.
- Alcohols, n.o.s., UN1987 (Alcohol mixtures containing up to 5% gasoline).
- Denatured alcohol, NA1987.
- Denatured alcohol, NA1987 (Alcohol mixtures containing up to 5% gasoline).
- Ethanol and gasoline mixture, UN3475.
- Ethanol and gasoline mixture, UN3475 (Alcohol mixtures containing up to 5% gasoline).

The rule of January 28, 2008 also:

- Updates references to consensus standards,

- Revises and clarifies certain hazard communication requirements,
- Clarifies transportation requirements applicable to dry ice, detonator assemblies, and explosives, and
- Expands the exceptions from regulation for small quantities of hazardous materials.

Reference: Federal Register, Vol. 73, No. 18, pp4699-4720, January 28, 2008 – available for download at <http://a257.g.akamaitech.net/7/257/2422/01jan20081800/edocket.access.gpo.gov/2008/E8-1211.htm>

Safe Travel with Batteries and Devices

By Beverly Howell and Abdul Khalid, HTIS

Effective January 1, 2008, the Department of Transportation (DOT) through the Pipeline and Hazardous Materials Safety Administration (PHMSA) will no longer allow **loose** lithium batteries in checked baggage on aircraft. In

order to prevent delays in your travel plans, the following tips are provided by the Transportation Security Administration (TSA) when carrying spare batteries:

- Keep batteries and equipment with you, or in carry-on baggage - not in your checked baggage! In the cabin, flight crew can better monitor conditions, and have access to the batteries or device if a fire does occur.
- Buy batteries from reputable sources and only use batteries approved for your device – avoid counterfeits! A counterfeit battery is more likely to cause a fire in your equipment – costing you more in the long run, and compromising safety.
- Look for the mark of an independent testing or standards organization, such as Underwriters Laboratories (UL) or International Electrotechnical Commission (IEC).

- Do not carry recalled or damaged batteries on aircraft. Check battery recall information at the manufacturer's website, or at the Consumer Product Safety Commission.
- Only charge batteries which you are sure are rechargeable! Non-rechargeable batteries are not designed for recharging, and become hazardous if placed in a battery charger. A non-rechargeable battery placed in a charger may overheat or cause damage later.
- Only use a charger compatible with your rechargeable battery – don't mix and match!
- If original packaging is not available for spare batteries, effectively insulate battery terminals by isolating the batteries from contact with other batteries and metal. Do not permit a loose battery to come in contact with metal

objects, such as coins, keys, or jewelry.

- Place each battery in its own protective case, plastic bag, or package, or place tape across the battery's contacts to isolate terminals. Isolating terminals prevents short-circuiting.
- Take steps to prevent crushing, puncturing, or putting a high degree of pressure on the battery, as this can cause an internal short-circuit, resulting in overheating.
- If you must carry a battery-powered device in any baggage, package it to prevent inadvertent activation. For instance, you should pack a cordless power tool in a protective case, with a trigger lock engaged. If there is an on-off switch or a safety switch, tape it in the "off" position.

Lithium Batteries: Safety and Security

Lithium-ion batteries, often found in laptop computers, differ from primary lithium batteries, which are often used in cameras. Some newer AA-size batteries are also primary lithium.

While there is no explosion hazard associated with either kind of battery, the Federal Aviation Administration (FAA) has studied fire hazards associated with both primary and lithium-ion cells, and their extensive research is publicly available. As a result of this research, the FAA no longer allows large, palletized shipments of these batteries to be transported as cargo on passenger aircraft.

The research also shows that an explosion will not result from shorting or damaging either lithium-ion or primary lithium batteries. Both are, however, extremely flammable. Primary lithium batteries cannot be extinguished with firefighting agents normally carried on aircraft, whereas lithium-ion batteries are easily extinguished by most common extinguishing agents, including those carried on board commercial aircraft.

TSA has and will continue to work closely with the

Federal Aviation Administration on potential aviation safety and security issues, and TSA security officers are thoroughly and continually trained to find explosive threats. TSA does not have plans to change security regulations for electronic devices powered by lithium batteries.

Reference: PHMSA Press Release 11-07, December 28, 2007.

DOT Forbidden Materials and Packages

By Eduardo Alvarado,
Chemical Engineer, HTIS

Under title 49 Code of Federal Regulation, the Department of Transportation (DOT) forbids the offering for transportation or transportation of the following items or materials:

- Materials that are designated "Forbidden" in Column 3 of the 49CFR172.101 table.
- Forbidden explosives as defined in 49CFR173.54. (See Forbidden Explosives below).
- Electrical devices which are likely to create sparks or generate a dangerous quantity of heat, unless packaged in a manner which precludes such an occurrence.
- For carriage by aircraft, any package which has a magnetic field of more than 0.00525 gauss measured at 15 feet from any surface of the package.
- A material in the same packaging, freight container, or overpack with another material, the mixing of which is likely to cause a dangerous evolution of heat, or flammable or poisonous gases or vapors, or to produce corrosive materials.
- A package containing a material which is likely to decompose with a self-accelerated decomposition temperature (SADT) of 122 °F or less, or polymerize at a temperature of 130 °F or less with an evolution of a dangerous quantity of heat or gas when decomposing or polymerizing, unless the material is stabilized or inhibited in a manner to preclude such evolution.
- Packages which give off a flammable gas or vapor, released from a material not otherwise subject to Hazardous Materials Regulations Subchapter C₁, and likely to create a flammable mixture with air in a transport vehicle.
- Packages containing materials (other than those classed as explosive) that will detonate during a fire.
- Except for a package containing a lighter design sample that meets requirements of 49CFR173.308(b) (2), a package containing a lighter (see 49CFR171.8) containing a Division 2.1 material, of a design that has not been examined and successfully tested by an

<p>authorized person under the criteria specified in 49CFR173.308(a)(4) or, a lighter design containing a Class 3 material, that has not been approved by the Associate Administrator.</p> <ul style="list-style-type: none"> An organic peroxide of the "ketone peroxide" category which contains more than 9 percent available oxygen. The category, ketone peroxide, includes, but is not limited to: 	<p>meets the requirements of 49CFR175.8(b)(1).</p> <p>The following explosives shall not be offered for transportation or transported:</p> <ul style="list-style-type: none"> An explosive that has not been approved in accordance with 49CFR173.56. An explosive mixture or device containing a chlorate and also containing: <ol style="list-style-type: none"> An ammonium salt, including a substituted ammonium or quaternary ammonium salt; An acidic substance, including a salt of a weak base and a strong acid. A leaking or damaged package or article containing an explosive. Propellants that are unstable, condemned or deteriorated. Nitroglycerin, diethylene glycol dinitrate, or any other liquid explosives not specifically authorized. A loaded firearm (except as 	<p>provided in 49 CFR 1544.219).</p> <ul style="list-style-type: none"> Fireworks that combine an explosive and a detonator. Fireworks containing yellow or white phosphorus. A toy torpedo, the maximum outside dimension of which exceeds 0.906 inch, or a toy torpedo containing a mixture of potassium chlorate, black antimony (antimony sulfide), and sulfur, if the weight of the explosive material in the device exceeds 0.01 ounce. Explosives specifically forbidden in the 49CFR172.101 table. Explosives not meeting the acceptance criteria specified in 49CFR173.57. An explosive article with its means of initiation or ignition installed, unless approved in accordance with 49CFR173.56.
<p>Acetyl acetone peroxide Cyclohexanone peroxide(s) Diacetone alcohol peroxides Methylcyclohexanone peroxide(s) Methyl ethyl ketone peroxide(s) Methyl isobutyl ketone peroxide(s)</p>		
<ul style="list-style-type: none"> An oxygen generator (chemical) as cargo on a passenger-carrying aircraft. This prohibition does not apply to an oxygen generator for medical or personal use of a passenger that 		

References: 49CFR173.21 and 49CFR173.54.

The First Set of Hazard Characterizations on HPV Chemicals

By Abdul H. Khalid,
Chemical Engineer, HTIS

The U. S. Environmental Protection Agency (EPA)'s "High Production Volume (HPV) Challenge Program" requires companies to provide the public with basic health and safety data on chemicals that are manufactured or imported in the United States in excess of a million pounds a year or more per year. As of June 2007, companies have sponsored more than 2,200 HPV chemicals, with approximately 1,400 chemicals sponsored directly through the HPV Challenge Program and over 860 chemicals sponsored indirectly through international efforts.

On September 10, 2007, the EPA released the first set of Hazard Characterizations on 101 HPV chemicals. These characterizations are based on the EPA's scientific review of the screening-level hazard, or toxicity

data that was submitted by the U.S. chemical industry through the EPA's HPV Challenge Program or other information previously collected by the agency. For additional information on this announcement, visit the HPV Challenge Program Web site at:

<http://www.epa.gov/hpv/>

Hazard characterizations include a summary of the data submitted, the EPA's evaluation of the quality and completeness of the data, and an assessment of the potential hazards that a chemical or chemical category may pose. The EPA will combine this information with human and environmental exposure information collected from the EPA's Inventory Update Reporting to develop a risk characterization and, based on that review, determine if additional action is needed to ensure the safety of the HPV chemicals' manufacture and use.

The agency intends to use this approach to assess risks and identify and take needed action on 3000 HPV chemicals by 2012. This was one of the elements of the North American chemical cooperation commitment announced by the U.S., Canada and Mexico at the Security and Prosperity Partnership North

American Leaders Summit in Canada in August, 2007. The EPA will continue to prepare and periodically post additional HPV chemical hazard characterizations as they are developed. The agency also intends to post risk characterizations on chemicals when they are developed and completed.

Those interested in the HPV Challenge Program or who need more information on this new release can contact Dale Kemery, phone: 202-564-4355 or e-mail at:

kemery.dale@epa.gov.

For general information contact Priscilla Flattery, phone: 202-564-2718 or flattery.priscilla@epa.gov. The first set of hazard characterizations are online at:

http://iaspub.epa.gov/oppt/hpv/hpv_hc_characterizations.get_report

Reference: EPA's HPV Information System (HPVIS) at:

<http://www.epa.gov/hpv/hpvis/about.htm>.



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EPA Guidance on Manifest Use for Rejected Shipments and Residues

By Tom McCarley,
Chemist, HTIS

The EPA has issued guidance on what to do with the Uniform Hazardous Waste Manifest when a designated treatment/storage/disposal facility rejects wastes sent to them from a generator. In those cases, the original destination facility now holding the waste should prepare a new manifest and enter their name/address information in block 5 and enter the originating generator's information in block 8.

In the case where the entire load is rejected in the transporter's presence, the original manifest can be used to forward the load on to a new destination facility.

The EPA indicates that this guidance will be subject to a Federal Register correction notice. In the mean time, a memorandum from Matt Hale, Director of the Office of Solid Waste at the EPA to the EPA Regional Waste Division Directors, outlines the EPA's position. That memorandum, dated May

14, 2007, is available from on the RCRA Online system at [http://yosemite.epa.gov/osw/rcra.nsf/0c994248c239947e85256d090071175f/D8449B73CD83D2D68525731000331CDA/\\$file/14770.pdf](http://yosemite.epa.gov/osw/rcra.nsf/0c994248c239947e85256d090071175f/D8449B73CD83D2D68525731000331CDA/$file/14770.pdf)

Reference: EPA Office of Solid Waste and Emergency Response Memorandum: Matt Hale to Regional Waste Division Directors, May 14, 2007, "Hazardous Waste Manifest Provisions for Rejected Shipments and Residues"

A New Approach in Prioritizing Environmental Chemicals Toxicity Testing

By Abdul H. Khalid,
Chemical Engineer, HTIS

In a news release of August 2, 2007, the U.S. Environmental Protection Agency (EPA) announced that the agency's National Center for Computational Toxicology (NCCT) released a list of 340 chemicals that would be evaluated under phase I of the ToxCast research program. NCCT initiated this program and is developing the ability to forecast toxicity based on bio activity profiling. According to the EPA, the ToxCast program is a new

approach towards chemical testing and will lead to chemical toxicity evaluation procedures. A list of 340 research chemicals is available at: <http://www.epa.gov/ncct/toxcast/news.html>. This list includes active and inert ingredients related to pesticides and industrial chemicals.

Under the Interagency Agreement, the EPA's NCCT and the National Institute of Health (NIH)'s National Chemical Genomics Center are working as a team to profile biological activity of a large collection of environmental chemicals. The objective of the 5-year Interagency Agreement is to generate data to support the ToxCast program. The goal of ToxCast program is to use computational methods to build models to predict potential for toxicity of environmental chemicals.

It is estimated that there are more than 10,000 environmental chemicals from several EPA programs that need prioritizing for further testing. For example, antimicrobials, inert pesticide ingredients, high-production-volume chemicals, drinking water contaminant candidates, endocrine disruptor, etc., generally have limited toxicological data

available for hazard and risk assessments. ToxCast program is being developed to provide a mean to efficiently and quantitatively prioritize these chemicals for detailed toxicological evaluation based on computational models using chemical descriptors and biological activity profiling fingerprints. This program sets priorities for toxicity testing of environmental chemicals to obtain critical information necessary to protect people and the

environment. The ToxCast Program started in 2006 and has implemented many of the National Academy of Sciences (NAS) reports recommendations. In a report of May 2007, the NAS called the EPA and other federal agencies to use advances in computers, genomics and cellular biology to speed up toxicity testing (<http://www.nas.edu/>). For further information on ToxCast, visit the EPA's web site at: [\[oxcast/news.html\]\(http://oxcast/news.html\) or contact Suzanne Ackerman, \(202\) 564-4355 or e-mail at: \[ackerman.suzanne@epa.gov\]\(mailto:ackerman.suzanne@epa.gov\).](http://www.epa.gov/ncct/t</p></div><div data-bbox=)

Reference: A New Era in Environmental Chemical Testing: ToxCast Phase I Chemicals Announced, August 2, 2007, EPA's web site at: <http://yosemite.epa.gov/opa/admpress.nsf/2007%20Press%20Releases!OpenView>

EPA Changes EPCRA Reporting for Dioxins

By Tom McCarley, Chemist, HTIS

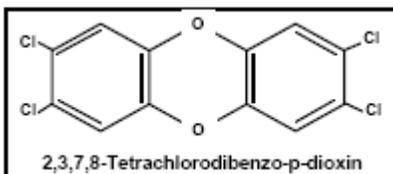
The EPA has finalized a rule that changes the way dioxins and dioxin-like compounds are reported under the Community Right-to-Know provisions of Section 313 (Toxic Release Inventory (TRI)) of the Emergency Planning and Community Right-to-Know Act (EPCRA). The applicable regulations are found at 40 CFR 372.65. The final rule was published in the May 10, 2007 Federal Register and became effective on July 9, 2007. Because TRI reports are due July 1 for the previous calendar year, the first reports using the new system for dioxins would be due July 1, 2009 reflecting calendar year 2008.

Dioxins are those chlorinated aromatic compounds believed to be extremely toxic and cause health effects at very low exposure levels. The different chemical compounds under the "dioxin" description have varying toxicities and the concept of toxic equivalencies (TEQs) and toxic equivalency factors (TEFs) are now internationally used to relate the differing toxicities of the compounds.

Prior to this final rule, facilities reported dioxin and dioxin-like compounds in units of total grams for the entire category and provide a single generic distribution of the individual dioxin and dioxin-like compounds at the facility. The new reporting requirement requires that, in addition to reporting total gram quantities for the category, facilities are required to report the mass quantity of each individual member of the category. Those individual mass quantities will be used by the EPA to perform toxic equivalency (TEQ) computations which will be made available to the public.

The most toxic of the dioxins is 2,3,7,8 – tetrachlorodibenzo-p-dioxin and is assigned a World Health Organization (WHO) TEF of 1.0. Most other dioxin isomers or related compounds will

have lower TEFs reflected lesser toxicity. Keep in mind that “lesser toxicity” is quite relative here as all of these compounds are highly toxic.



Dioxin compounds preceded by their Chemical Abstracts (CAS) numbers and followed by their assigned TEFs are given here. You will note that four of the compounds have two TEFs indicated; the original 1998 assigned value and an updated 2005 value indicated in parentheses which EPA will use.

01746-01-6, 2,3,7,8-tetrachlorodibenzo-p-dioxin, 1.0;
 40321-76-4, 1,2,3,7,8-pentachlorodibenzo-p-dioxin, 1.0;
 39227-28-6, 1,2,3,4,7,8-hexachlorodibenzo-p-dioxin, 0.1;
 57653-85-7, 1,2,3,6,7,8-hexachlorodibenzo-p-dioxin, 0.1;
 19408-74-3, 1,2,3,7,8,9-hexachlorodibenzo-p-dioxin, 0.1;
 35822-46-9, 1,2,3,4,6,7,8-heptachlorodibenzo-p-dioxin, 0.01;
 03268-87-9, 1,2,3,4,6,7,8,9-octachlorodibenzo-p-dioxin, 0.0001 (0.0003);
 51207-31-9, 2,3,7,8-tetrachlorodibenzofuran, 0.1;
 57117-41-6, 1,2,3,7,8-pentachlorodibenzofuran, 0.05 (0.03);
 57117-31-4, 2,3,4,7,8-pentachlorodibenzofuran, 0.5 (0.3);
 70648-26-9, 1,2,3,4,7,8-hexachlorodibenzofuran, 0.1;
 57117-44-9, 1,2,3,6,7,8-hexachlorodibenzofuran, 0.1;
 72918-21-9, 1,2,3,7,8,9-hexachlorodibenzofuran, 0.1;
 60851-34-5, 2,3,4,6,7,8-hexachlorodibenzofuran, 0.1;
 67562-39-4, 1,2,3,4,6,7,8-heptachlorodibenzofuran, 0.01;
 55673-89-7, 1,2,3,4,7,8,9-heptachlorodibenzofuran, 0.01;
 39001-02-0, 1,2,3,4,6,7,8,9-octachlorodibenzofuran, 0.0001 (0.0003).

Reference: Federal Register, vol. 72, No. 90, pp20544-20554, May 10, 2007.

Recycling of Hazardous Secondary Materials

By Tom McCarley,
Chemist, HTIS

In a November 2006 document posted at [http://www.epa.gov/epaoswer/hazwaste/dsw/abr-](http://www.epa.gov/epaoswer/hazwaste/dsw/abr-rule/good-prac.pdf)

[rule/good-prac.pdf](http://www.epa.gov/epaoswer/hazwaste/dsw/abr-rule/good-prac.pdf) (46 pages), the EPA looks at the issue of recycling of hazardous secondary materials in the document “An Assessment of Good Current Practices For Recycling of Hazardous Secondary Materials” Solvents and metal wastes are common examples of hazardous secondary

materials that can be recycled.

Reviewing the current management of these secondary materials is part of a large EPA effort to redefine the scope of “solid waste” in the regulatory sense and possibly remove some of the current regulatory

burden and disincentive to recycling.

Sections of the assessment are:

- Introduction,
- Current Incentives for Responsible Recycling,
- Recycling and Waste Management Practices to Mitigate Environmental Risks,
- Assistance Available to Industry To Promote Responsible Recycling,
- Case Study: Due Diligence for Used Electronics, and
- Conclusions.

An appendix includes reference citations and a List of Items Found that May be Covered in an Audit of a Waste or Recycling Company.

Reference: "An Assessment of Good Current Practices For Recycling of Hazardous Secondary Materials", November 22, 2006 – at <http://www.epa.gov/epaoswer/hazwaste/dsw/abr-rule/good-prac.pdf>

Health Hazards Associated with Birds and Bat Feces

By Ariel Rosa,
Environmental Protection Specialist, HTIS

Some bird-borne infectious diseases such as West Nile, Lyme disease, and avian influenza can be transmitted from birds to human directly or through intermediate vectors such as mosquitoes and ticks. Birds harbor over forty types of parasites and can host internally over sixty types of infectious diseases. These diseases vary in seriousness from minor stomach ailments to fatal diseases such as histoplasmosis, which is the most common bird-borne disease now. The role of avian species in spreading disease has been of particular concern to scientists because birds are ubiquitous and can move pathogens over long distances quickly.

Fortunately, human interaction with most bird species is minimal, thus drastically reducing health threats from most birds. However, a few bird species, (the pigeon, starling and house sparrow) have successfully adapted to our urban environment. They have learned to survive by

nesting in our buildings and eating our food. Their adaptation to our communities has brought them into close proximity to humans, thus becoming a major nuisance in our cities and posing a serious health risk.

Bird feces accumulate wherever birds congregate to rest during the day or roost at night. Accumulation of bird manure inside buildings, under trees near human habitations, or on structures and machinery is undesirable and also, as stated above, harbor disease organisms harmful to humans and domestic animals. The high nutrient content of accumulated bird and bat manure provides an excellent growth medium for the causative organisms of cryptococcosis and histoplasmosis. Note: Bat feces present similar health hazards since some of the same molds that grow on bird feces, also grow on bat feces.

The dried avian feces has been recognized by environmental and safety and health professionals as a significant occupational health hazard to exposed individuals such as bird-keepers and construction workers. Potentially exposed individuals are those that are routinely caring for birds (wildlife

or pets) or are involved in the renovation or demolition projects of old abandoned buildings where years of roosting has resulted in large piles of bird feces, dead birds, nesting materials, and live birds. Other jobs presenting high exposure risk may include: bridge inspectors, painters, chimney cleaners, farmers, gardeners, HVAC system installers or service personnel, roofers and pest control workers.

How Birds Harbor and Spread Disease?

Birds can harbor and spread disease by any of the following mean:

- The disease is contained inside the bird and passed on through defecation;
- The disease lives in the birds surrounding environment (nesting materials or droppings) and is spread by the birds lifestyle; or
- The disease lives inside a parasite that the bird harbors.

How Diseases are Passed from the Birds to Humans?

1. Food & water contaminated with feces

Contamination of food and water supply may occur if (e.g.) diseased birds directly defecate into a water reservoir or if birds gain access to a food processing plants. In addition to direct contamination, airborne spores from dried feces in air ducts and vents can settle on exposed food and transfer disease. Several thousand cases of food poisoning (Salmonella) every year are attributed to this disease transmission route.

2. Inhalation of fecal dust

As bird feces and/or the contaminated soil it rests on dries or is disturbed, microscopic pieces break off and become airborne. The inhalation of avian fecal dust presents a significant potential exposure to the fungi and/or bacteria, some of which can cause serious infections in humans. When breathed into the lungs, the warm, moist environment of the lung lining provides a breeding ground for the infectious agents. Common symptoms of this type of infection are flu like in nature and may include: coughing, elevated temperature, restricted breathing and general body fatigue. These symptoms may last a few days.

2. Direct contact with feces

Infection may occur when a worker or resident gets fecal dust or droppings in an open wound or cut. The wound site becomes red, puffy and puss-filled. Antibiotics are often needed to cure the infection. In some rare cases, infection of the blood (Sepsis) or internal infection can also occur, causing serious illness or death. Proper personal protective equipment and care must always be used when cleaning a bird site or installing bird control products. If a cut or injury occurs, thoroughly wash and disinfect the wound and cover with a sterile bandage to minimize risk of infection.

3. Associated Parasites

Birds harbor ticks, fleas, mites and other ectoparasites. The parasite bites an infected animal and sucks in blood containing the germ. When the bug bites its next victim it passes along the germ to the new victim. This occurs because parasites inject some of their saliva into the host when feeding. Over forty types of parasites live either on the birds, in their nests or in the places they roost. They are responsible for the transmission of several hundred viral and bacterial agents. These diseases include plague,

encephalitis, pox and meningitis. Control of these parasites is a crucial phase of a bird control project. Unless the parasites are exterminated when the birds are excluded from a site, the mites, fleas, ticks etc. will seek a new host, often the human inhabitants. Therefore, parasite extermination should always be included in a bird control project.

Zoonotic diseases are those diseases shared by animals and humans. The infectious agents can be protozoal, fungal, bacterial, chlamydial or viral. Individual susceptibility and the seriousness of these various microbial infections vary with age, health status, immune system condition, and whether early treatment is sought. The ability of a microorganism to make a person sick varies with the virulence of the organism, the dose to which the person is exposed, as well as route of infection.

Cryptococcosis

Cryptococcus neoformans is a fungus that prefers to grow in soils enriched with avian manures. The incubation period is probably weeks. Infections are seen in many mammals, but occur most frequently in humans, horses, dogs, and cats.

Infections are rare in birds. Transmission of cryptococcosis is usually by inhalation of this yeast-like fungus, although it can occasionally occur by ingestion. Humans can pick up cryptococcosis from exposure to old pigeon nests or droppings. In humans, cryptococcosis is manifested as meningitis or meningoencephalitis, and it is usually preceded by pulmonary infection with cough, blood-tinged sputum, fever, and malaise. The course of the disease is usually chronic. There is usually fever, cough, chest pain, and spitting of blood from the respiratory tract, followed by headache, stiff neck and visual disturbances.

Histoplasmosis

Histoplasmosis is a disease caused by a fungus (*Histoplasmosis capsulatum*), which grows in pigeon droppings. It also grows in soils and is found throughout the world. When cleaning droppings a person may breathe in some of the fungus, which in cases of high exposure can cause infection. Common activities, such as cleaning off windowsills, will not result in high exposures. Symptoms of histoplasmosis begin to appear about 10 days after initial infection and include fatigue, fever, and chest pains. Most people,

however, do not show any symptoms. Those with compromised immune systems such as cancer patients or people living with HIV/AIDS are generally more at risk of developing histoplasmosis. The disease cannot be transmitted from person to person.

Chlamydiosis

Chlamydiosis, also known as psittacosis, is a disease that affects a wide variety of bird species. It is also transmissible from birds to humans. Since the human disease is usually associated with parrots (including parakeets and cockatiels), physicians often call the infection "parrot fever" or psittacosis. In humans this bacterial disease is characterized by: fatigue, fever, headache, rash, chills, and sometimes pneumonia. Symptoms develop about 10 days after exposure and nationwide, 100-200 human cases are reported annually. Chlamydiosis associated with birds is a different disease from the human venereal disease known by the same name.

Many avian diseases are transmitted by ingestion of food contaminated by fecal matter or through inhalation of fecal dust. The more susceptible groups to avian diseases are the very young, the

elderly, and those with compromised immune systems. The best work practice in the prevention of avian diseases, is whenever feasible, to prevent the accumulation of manure. Therefore, whenever a colony of bats or a flock of birds is discovered roosting in a building, immediate action should be taken to exclude the intruders by sealing all entry points. A variety of bird control devices are commercially available, however when choosing bird control systems any measure that might unnecessarily harm or kill bats or birds should be avoided.

The next step in prevention simply involves proper hygiene and sanitation. Therefore, to avoid inhaling fecal dust and coming in contact with fecal matter when working in projects that involves the removal of bird feces, respiratory protection and other appropriate personal protective equipment such as disposable coverall and gloves are recommended. It is important to note that whenever these functions are performed considerations should be taken to protect both the health of the workers and the general public.

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OSHA Issues New Combustible Dust Compliance Instruction

By Abdul H. Khalid and Ariel Rosa, HTIS

On October 19, 2007, the Occupational Safety and Health Administration (OSHA) announced a "National Emphasis Program" that would focus on the fire and explosion hazards that might exist due to combustible dusts accumulated at places of employment and how to avoid fire and dust explosions.

OSHA published a compliance directive entitled, "Combustible Dust National Emphasis Program" that provide detailed policies and procedures for inspecting workplaces and handling combustible dusts.

According to OSHA, this program will focus on the fire and explosion hazards

that may exist at facilities where combustible dusts accumulate and how to comply while handling combustible dusts.

Under the Occupational Safety and Health Act of 1970, employers are responsible for providing a safe and healthful workplace for their employees. The information described in this compliance directive is useful in educating businesses on how to achieve compliance with OSHA requirements in advance of any inspection. The instructions provide detailed information on OSHA's inspection scheduling, resource allocation, inspection resources and procedures. This information is particularly useful in educating businesses on how to achieve compliance with OSHA requirements. The instruction is available online from the OSHA's Web site at:

http://www.osha.gov/OshDoc/Directive_pdf/CPL_03-00-006.pdf.

Combustible dusts can be found in the agriculture, chemical, textile, forest, and furniture industries and include:

- Metal dust such as aluminum and magnesium,
- Wood dust,

- Coal and other carbon dusts,
- Plastics dusts and additives,
- Bio-solids,
- Other organic dusts such as sugar, paper, soap and other materials, and
- Certain textile materials.

Standards that may be cited if combustible dust hazards are found during inspections include the housekeeping standard, the storage area housekeeping standard, the grain handling facilities standard, and the general duty clause. The National Fire Protection Association (NFPA) standards listed in appendix A of this directive should be consulted for hazard recognition and feasible abatement methods. For further information on compliance issues, visit the OSHA web site at: <http://www.dol.gov/compliance>

Reference: 1. U.S. Department of Labor/Occupational Safety & Health Administration web site at: <http://www.osha.gov/> 2. OSHA Trade News Release. October 19, 2007 at: http://www.osha.gov/pls/oshaweb/owadisp.show_do

[cument?p_table=NEWS_RELEASES&p_id=14597](#)

Silicon Nanowires

By Moraima Lugo-Millán,
Chemist, HTIS

Nanotechnology is growing faster and efficiently in every aspect of our life. Researchers have been using this technology and its applications to efficiently develop cosmetics, lotions, stain resistant clothing, protective coatings, drug delivery methods, water purification processes, explosives and chemical detection tools, fuel cells, electronic and computer devices, among others. This technology offers infinite applications.

Lately, nanotechnology has been efficiently used in lithium-ion (Li-ion) batteries for improve energy utilization and to minimize the dangers that these batteries provide. Also manufacturers are seeking longer and more efficient batteries for electronic devices such as laptops, digital cameras, MP3 players, cell phones, etc. Researchers have been studying different materials for these applications and discovered that silicon is one of the best alternatives, because the

element is abundant, is easier to process, less expensive, environmentally friendly, and it is used in semiconductors and high-tech devices such as computer chips. By itself, silicon is a poor thermoelectric material, but forming silicon into discrete nanostructures increases its thermoelectric potential.

By nanostructuring silicon, researchers can reduce its thermal conductivity, making the material more effective for thermoelectric applications. Scientists from Stanford University have found that silicon nanowires are able to increase the life of the lithium-ion batteries by up to 10 times by absorbing more lithium ions than graphite anodes. A lithium battery delivers charge by transferring lithium ions from the anode (usually made from graphite/carbon) to the cathode (a metal oxide). The electrical storage capacity of Li-ion batteries is limited by the amount of lithium that can be held in the battery's anode. According to studies, replacing the graphite anode with one made from silicon nanowires, seems to be the clue for extending the life of the batteries. Silicon nanowires transform heat

into electricity and store more charge than other materials. Researchers have discovered that this new battery technology involving silicon nanowires produces ten times the amount of electricity of existing Li-ion batteries, which is a great alternative for extending the use of battery-run in electronic devices.

The Department of Energy and the University of California at Berkeley, have widely studied silicon nanowires as potential devices that harvest wasted heat and turn it into electricity. The applications of this technology include the development and enhancement of electric vehicles, and personal power jackets that could use heat from the human body to recharge electronic devices. According to researchers, thermoelectric materials, which have the ability to convert heat into electricity, could potentially, be used to capture much of the low-grade waste heat now being lost and convert it into electricity, resulting in enormous savings on fuel and carbon dioxide emissions. Also these devices can be used in refrigerators and air conditioners, making the cooling and heating

processes more localized and efficient.

Silicon nanowires are part of the nanomaterial innovations, which drive advances in battery technology and promise significant enhancements in other thermoelectric applications. This is a technology that will continue to grow and improve. It endeavors to be efficient not only in the operational aspect, but it also promises to be cost effective for manufacturers and consumers, and environmentally benign.

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Bacteria Identified That Can Detoxify PCBs Without Dredging

By Abdul H. Khalid,
Chemical Engineer, HTIS

In May 2007, the Environmental News Service announced that researchers have identified a group of bacteria

(bioremediation technology) that could detoxify a common type of polychlorinated biphenyls (PCBs) without dredging. This research is funded by the National Science Foundation and General Electric experts in the area of PCBs containing compounds.

PCB compounds are known for their carcinogenicity and are used as coolants and lubricants. These compounds have contaminated more than 250 U.S. sites (superfund sites), including lake and river sediments. According to Frank Loeffler, an associate professor in the Georgia Tech School of Civil and Environmental Engineering and the School of Biology, the dehalococcoides (Dhc) group of bacteria is responsible for the dechlorination of Aroclor 1260. These microbes replace the chlorine atoms in Aroclor 1260 with hydrogen, which fuels their growth and initiates the PCB degradation process. Once Dhc bacteria dechlorinate Aroclor 1260 to a certain level, other microbes will degrade it further and completely detoxify the PCB.

This bacterial discovery is a first step towards a bioremediation strategy

that would naturally detoxify PCBs without a risky removal of the sediments in which they persist.

Compounds containing PCBs have been banned from production in the United States since 1977 because of their toxicity to humans and animals. The full text of this news is available at:

<http://www.ens-newswire.com/ens/may2007/2007-05-01-02.asp>.

Reference: Environmental New Service web site at:

<http://www.ens-newswire.com/>

BioFuels and BioProducts Huge Challenges and Huge Rewards

By Tom McCarley,
Chemist, HTIS

For millennia, agriculture has served mankind by providing the three “Fs” – Food, Feed, and Fiber. Now a fourth “F” is becoming critical – Fuel.

Biobased products and fuels from renewable crop sources is the focus of major research efforts by academia, government, and industry these days. Leading the charge for the government research

efforts are the Department of Agriculture through its Agricultural Research Service (ARS) with research centers throughout the country. The Department of Energy also has a major research role.

The state of current research efforts into providing a portion of our energy needs from bio sources was the subject of a 2-1/2-day symposium hosted by the Agrochemicals Division of the American Chemical Society at its March 2007 meeting in Chicago. Sustainability of water, energy, and food was a theme for the entire conference.

In the first major energy law in a decade, the Energy Policy Act of 2005 (Public Law 109-190 of August 8, 2005) contains many provisions for funding research and setting goals that are intended to lessen our dependence on foreign sources of oil and its refined products. The challenge is daunting, especially with respect to the 140 billion gallons of those liquid refined fuels gasoline and diesel for the transportation sector in this country.

Section 1501 of the Energy Policy Act calls for 7.5 billion gallons of

renewable fuel in gasoline and diesel by the year 2012. The good news is that the goal will be achieved ahead of schedule as early as 2008.

The not-so-rosy news is that most of that fuel is ethanol (ethyl alcohol) which is replacing methyl-tertiary butyl ether (MTBE) as a cleaner burning oxygenate additive in gasoline that is required in mostly urban areas. Most of the ethanol comes from corn and there are currently nearly 100 plants operating today in the US to convert corn into fermentable sugars for fermentation into ethanol. More than 30 additional corn to ethanol plants are under construction. There are still many barriers to the use of food crops for ethanol production, not the least of which is the “food” vs “fuel” political debate that is very much in the news. The recent record commodity prices for corn have farmers indicating they will plant an amount of corn not seen since the 1940s. In fact, 56% of corn production goes to animal feed. Currently 13% of corn production is used to produce fuel ethanol. But even if the **entire** corn crop was converted to fuel ethanol, it would only replace 15% of our transportation gasoline. Clearly something

additional is needed. That something appears to be the cellulosic material from a variety of plants (biomass) including corn. Currently, the corn to fuel plants only use the small amount of starch in the corn. The larger amount of cellulose and hemicellulose in corn and other plants is tougher to break down and is so-far untapped for commercial fuel production in the US. Therein lies the tremendous challenge and research efforts underway, "Getting at" the cellulosic part of corn alone and converting it to ethanol could replace up to 30% of our current gasoline use, but require a pre-treatment scheme. That pre-treatment scheme may involve corrosive sulfuric acid. Section 942 of the Energy Policy Act calls for 1 billion gallons of cellulosic biofuels to be produced by year 2015.

A great deal of research sponsored by the Energy Department and USDA is focusing on the use of other biomass to produce fermentable sugars for ethanol production. In the plains states, for example, much of the land is marginal and has been taken out of production but switchgrass grows well for little input on the farmer's part (\$36-49 per ton) and research is underway to maximize the ethanol

production from switchgrass (currently about 80 gallons of fuel per ton of switchgrass).

Production of fuel ethanol from sugar cane and sugar beets is also the subject of much research. Other research programs are looking at the conversion of everything from municipal solid waste (most of which is cellulosic – paper), to wood chips, to rice residue, desert plants and even fungal mold so evident after Hurricane Katrina are viewed as possible sources of fuel.

One of the major problems with conversion of cellulosic materials to fuel is that fermentation inhibitors (furfural and related products) are also produced and research on how to deal with inhibitors is under way.

As fermentation is involved an understanding of yeast and enzyme action, a great deal of research is involving the search for the optimized team of microbes and enzymes to carry out the carbohydrate to ethanol reaction.

And let's not forget the most efficient cellulose bioreactor of them all – the termite. This, the most destructive insect breaks down cellulose in wood

with a vengeance with the able assistance of hundreds of different microbes in its gut. The termite and its microbes are being studied as well in this effort.

Biodiesel from soybeans as a replacement for petroleum diesel has also been in the news. There are numerous challenges here as well, not the least of which is the lack of regulatory or consensus standards for biodiesel blends. The only specification for biodiesel is ASTM D6751 but the specification only applies to B100 – 100% biodiesel and not to biodiesel blends. There are many problems with biodiesel yet to be researched such as oxidative instability, problems with pipeline pumping and distribution, flash point issues, and filter plugging.

Use of the waste products from crop conversion to ethanol is a must for full economic realization of crop to fuel plants. These bioproducts and those made directly from harvested plant materials shows tremendous promise. Several types of plastics, lubricants, and fluids are being produced from plants and should be headed for commercialization in the short term. For Bioproducts, Section 9002

of the Farm Security and Rural Investment Act 2002 calls for the USDA to designate biobased products to be preferably purchased by Federal Agencies. As of March 2007, some 36 categories of products have already been proposed with more

to come. Lubricants, cleaners, solvents, and deicers are just a few of the products that will be managed by the Defense Logistics Agency when available for purchase.

Reference: Symposium: "Agricultural Biomass,

Biobased Products and Biofuels", Agrochemicals Division of the American Chemical Society at its' 233rd National Meeting, Chicago, March 2007

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