

Cradle to CradleSM Certification of RainTube[®]

Prepared for
GLI Systems, Inc.

prepared
by MBDC
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Executive Summary

GLI Systems, Inc., asked MBDC to review its RainTube® for Cradle to CradleSM Certification. MBDC worked with GLI Systems to complete data collection for the certification criteria.

This product has successfully achieved the certification criteria at the following tiers:

Criterion \ Tier	Basic	Silver	Gold	Platinum
Materials			✓	
Material Reutilization / Design for Environment				✓
Energy			✓	
Water			✓	
Social Responsibility			✓	

RainTube® is Cradle to Cradle Certified^{CM} at the Gold tier through July 7, 2009. Prior to the conclusion of the first year, GLI Systems will have the option to renew the product certification, including potential improvements on the energy, water or social responsibility criteria. Annual retesting and assessment of the recycled HDPE content will be required.

Cradle to Cradle Certified^{CM} is a certification mark of MBDC.

Cradle to CradleSM Certification of GLI Systems RainTube[®]: Results

RainTube[®] is Cradle to Cradle Certified^{CM} at the Gold tier, derived from the following assessment results.

Materials

RainTube[®] is comprised of 95% recycled post-consumer HDPE and 5% virgin HDPE/carbon black mixture.

MBDC oversaw and reviewed contaminant testing of the recycled HDPE content for toxic heavy metals (antimony, arsenic, beryllium, bismuth, cadmium, chromium, cobalt, lead, manganese, mercury, molybdenum, nickel and tin; detection limits < 1ppm) and halogens (fluoride, chloride, bromide). Individual heavy metal concentrations were in the low ppm range (chromium = 26.6ppm, lead = 12.9ppm, all other metals < 4ppm each except mercury, bismuth and beryllium which were not detectable) while individual halogens (as elements) were in the mid ppm range (fluoride = 9ppm, chloride = 44ppm, bromide = 10ppm on average of two samples).

Table 1 below lists the results of the individual material assessments.

Table 1: RainTube[®] Components

COMPONENT	MFGR	ASSESSMENT	COMMENTS
Recycled HDPE	Merlin Plastics	YELLOW	This material is acceptable for use from a Cradle to Cradle perspective.
Black polyethylene concentrate (PE-500 A LD)	MDI	YELLOW	This material is acceptable for use from a Cradle to Cradle perspective.

Since the product is used outdoors, emissions tests are not required for Gold achievement.

RainTube[®] achieves the Gold certification tier for the Materials criteria.

Material Reutilization / Design for Environment

RainTube[®] is manufactured of 95% recycled material, which is 100% recyclable. Combining these values for recyclability and recycled content, RainTube[®] receives a Nutrient Reutilization Score of 98, which is within the Platinum range.

GLI Systems has implemented a well defined recovery plan for RainTube[®] (Appendix B). This includes providing consumers with information describing post-use recovery. RainTube[®] can be deposited by the consumer at any recycling center that accepts colored HDPE. Alternatively, Certified Installers have been trained to recycle RainTube[®] upon removal.

Overall, the product achieves the Platinum certification tier for the Material Reutilization/Design for Environment criteria.

Energy

GLI Systems meets requirements at the Gold certification tier for the Energy criteria. 6% of the manufacturing plant energy use currently comes from renewable sources. GLI Systems has offset the additional 94% of manufacturing energy through the purchase of green-e certified

renewable energy certificates for a full year of manufacturing. In addition, GLI has offset >13% of their headquarters energy use. See Appendix C for energy use data.

Water

The company manages its facilities to promote quality of water effluent and water conservation, as reflected in the statements noted in Appendix E. This includes the recycling of all water in the cooling bath and the capture and use of rainwater for native landscaping on site. These statements and efforts qualify RainTube® for Gold achievement for the Water criteria. (See Appendix D for water use data.)

Social Responsibility

GLI Systems seeks to integrate social responsibility into its internal operations and external partnerships, as evidenced by the statements listed in Appendix F. This progress qualifies the product for Gold achievement for the Social Responsibility criteria.

Cradle to CradleSM Certification of GLI Systems RainTube[®]: Conclusions/Recommendations

Conclusions

RainTube[®] from GLI Systems, Inc. is Cradle to Cradle Certified^{CM} at the Gold tier through July, 2009, as evaluated by MBDC.

GLI Systems is an excellent example of a company designing a 100% recyclable product, which can also be easily recycled by the final customer. The company is progressing in the areas of renewable energy use, water use efficiency, water quality and social responsibility.

Cradle to Cradle Certification Mark

The Cradle to Cradle certification marks (image mark and word mark) are available for use. GLI Systems will be asked to execute a license agreement and follow the requirements of MBDC's style guide for use of the certification marks.

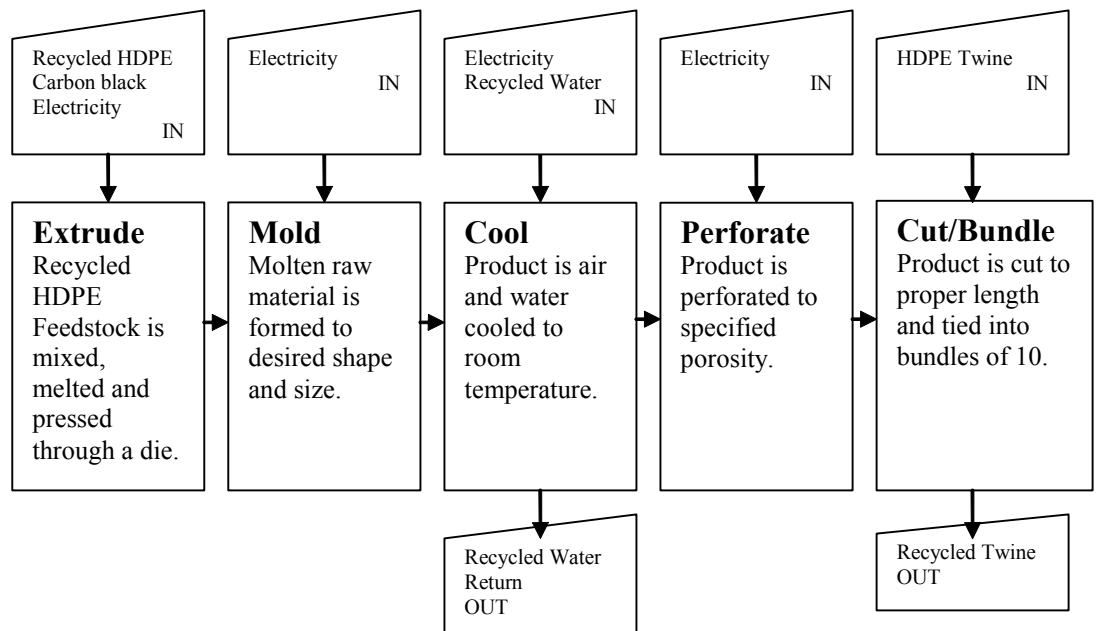
GLI Systems' suppliers may not present their own product components as certified.

Recommendations/Next Steps

GLI Systems, Inc. has developed a valuable, ecologically-intelligent product, achieving a Gold certification for RainTube[®]. However, there exist opportunities to improve the product to achieve higher certification tiers in the future, such as the following:

- Annually retest the recycled HDPE for potential heavy metal and halogen contaminants
- Work with your supply chain to quantify and offset the energy used to manufacture the components of the product.
- Implement additional innovative water conservation and water quality measures at the manufacturing and/or headquarters facilities such as installation of composting toilets or a green roof.
- Initiate auditing for social responsibility through a third-party assessment system (e.g., SA8000) for the manufacturing facility

Appendix A: RainTube® Process Flow Diagram



Provided by GLI Systems, Inc., June, 2008

Appendix B: Post-Use Product Recovery & Material Reutilization Program

Design and Manufacturing for post-use recovery

RainTube is designed for and manufactured with post-consumer recycled High Density Polyethylene (HDPE) feedstock. 95% of the materials used in the RainTube installations are HDPE and 100% are recyclable. HDPE has an extremely long useful life (over 50 years) after which it may be recycled again and again with very little degradation. This durability combined with recyclability is why we chose to use this material for our RainTube product.

Manufacturing using HDPE is simple and straightforward. The machinery used is large and complex but the process involves only a few steps. Renewable electricity is used exclusively to power all machinery. A small amount of water is used in the process to help cool the machinery and product. This water is captured and recycled over and over in a closed system with very little loss to evaporation. The HDPE raw feedstock is melted, formed into shape, cooled, cut to size, bundled and loaded onto trucks with no product loss and zero waste.

RainTube is shipped and sold without packaging. Instead it is bundled together in groups of 10 tubes each and tied with HDPE twine made from scrap materials. The twine is collected after shipping and reused or recycled.

Installer training for post-use recovery

All installers of the RainTube product must complete 9 hours of material handling and other certification training. The certification training includes instruction on installation techniques that eliminate product waste and allow for ease of removal of the RainTube at the end of its useful life. RainTube is shipped without packaging and the Certified Installers are trained to recycle the twine used to tie the material in bundles.

RainTube is installed with no mechanical attachments to the structure making the initial installation and the subsequent removal quick and easy. The RainTube material does not degrade and has a long useful life. It comes with a factory lifetime warranty so there is little need to remove or replace the product.

Sales information for post-use recovery

RainTube is sold with detailed consumer educational information about HDPE and its recyclable characteristics. This information is available with the initial product sales literature and is also included on the website and with the post-sale leave-behind material. Consumers are educated before purchase about the RainTube removal process and encouraged to recycle the material if and when it is no longer needed.

De-Installation and recycling options and guidelines

RainTube provides consumers the following detailed information describing post-use recovery. This information is included on the written warranty and can also be found on our website www.raintube.com/post-userecovery.

1. RainTube post-use removal service: Contact any local installer listed on the www.raintube.com website and explain that you would like to participate in the RainTube Post-use Recovery Program. You will be provided with a quote for removal of the RainTube. Once removed, the Certified Installer will then deliver it to a recycling center at no charge.

2. Self removal: RainTube is best removed on warm sunny days as this allows the material to become softer, more pliable and easier to work with. Be sure that you have proper gear and safety equipment. Be careful of insects, especially wasps or hornets that may have nests built around the edges of the roofing system. Start the removal process at an outside end or corner by removing the end-cap and squeezing the tube while lifting it straight up out of the gutter. Do not pull on the RainTube if it becomes hung up as this may damage the roof or the gutter. Instead, compress the material as much as possible to free it up. Work around the perimeter of the home and remove any screws or metal fasteners at the corners. Lift the RainTube up to release it from the brackets. RainTube can usually be removed in full 13' lengths. Cut the removed material into more manageable lengths of 2'-3' for easy transportation. The removed material can be delivered to any recycling center that accepts colored HDPE materials (these are typically plastic food containers with this symbol on them. Do not place RainTube in the milk jug recycling area as this is reserved for non-colored HDPE material.

Provided by GLI Systems, Inc., June, 2008

Appendix C: Energy Use Data

Headquarters

Total HQ power used: 12,078 KWh
 Less 100% renewable 12,078 KWh
 HQ Power from non-renewable sources -0-

RainTube Manufacturing Plant (Hubbard, Oregon)

Total RainTube produced: 31,457 pounds
 Total power used @ 0.960768/pound: 30,223 KWh
 Less 6% Renewable: 1,813 KWh
 Plant power from non-renewable sources: 28,410 KWh

30,000 kWh CoolWatts purchased from NativeEnergy July 2, 2008

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Appendix D: Water Data

Water source: on site well

Site is not located in or adjacent to a Ramsar listed wetland

Watershed = Tualatin, USGS# 17090010

We are using less than .00724 gallons/ft of our RainTube product. At current production levels of 125,929' per year we will use the following in cubic meters per year:

Domestic Water (faucets, toilets, hose bibs, sinks)	1.65
Cooling Bath make up	0.97
Cooling tower make up	0.83
Landscape	0.00

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Appendix E: Water Stewardship Statements

GLI Systems Inc.
 Water Stewardship Principles and Guidelines

Executive Statement

Businesses, communities, and ecosystems everywhere depend on clean fresh water to survive and prosper. Global demand for freshwater however, continues to grow, while many water sources are showing signs of stress. Water issues are reshaping the global business environment and we believe understanding these trends will better position GLI to identify new market opportunities, mitigate risk, develop sustainable strategies, and create shareholder value.

While water is a global issue, the impacts are felt locally. The value placed on water by communities and their understanding of this value varies widely based on availability, climate,

culture, industry, the local environment and the infrastructure in place. Water value can even vary extensively within one community with alternative water uses resulting in competing interests such as jobs versus food.

Water is an issue for both the developed and developing worlds. Today, many in our developed world take water for granted assuming that it will always be available at minimal cost. This is mainly due to the perception of an eternally abundant water supply and the misleadingly low cost of water in most areas. Even in areas that experience water shortages, water is usually one of the cheapest raw materials. Water may be well understood but it is certainly not well enough valued. It is only by raising awareness that change can be brought about in behavior and attitudes.

We believe that it is becoming ever more apparent that all of us need to take action toward conservation now! Water is a human right not a business right. If we are going to continue to use fresh water over the long term, we need to understand our impacts, and how we can reduce them. Forming a sustainable water solution requires all employees from the shop floor to top management to understand its value. To gain understanding we have developed this set of use principals or “Water Ethics” and begun to carefully monitor the water footprint of our products and services. With this information we identify areas of high water impact, develop solutions for improving water efficiency and reduce overall water usage. We look forward to a future with abundant clean water and sharing what we’ve learned along the way.

E. William Savage CEO

Stephen L. Spratt VP

GLI Systems, Inc. has adopted the following set of principles as a guide to the future management and use of water resources.

- Our corporate water use shall be accounted for throughout the entire value chain (suppliers, administration, manufacturing, distribution, use and post-use).
- Our water sources will be protected from contamination and careful consideration given to efficiency at every point of use.
- Potable water should, to the highest extent possible, only be consumed for life-sustaining functions.
- Waste water shall be returned to the earth in a safe and beneficial manner using organic treatment systems as needed to accomplish this.
- No ground water contamination shall result from any use of water resources related to the construction or operation of our facilities.
- Rainwater and surface run-off water shall be utilized as much as possible and considered a cyclic resource for our building systems.
- Our facilities shall minimize impermeable ground cover.
- Gray water shall as much as possible be treated and applied to practical or natural purposes suitable to its characteristics.
- Water used in any of our manufacturing process-related activities shall be minimized, put back into circulation and all discharges shall exceed EPA standards.

Water use goals

1. Determine, understand and monitor our water use footprint.
2. Minimize our negative effect on water ecosystems.
3. Develop innovative solutions through educating and empowering employees to improve our use of water resources.
4. Share our best practices and innovations with others.
5. Encourage others (suppliers and customers) to adopt our water principals.
6. Develop good measurement and regular reporting standards.
7. Conduct a review with employees to develop and implement improvements.

Perspectives

- 450 million people in 29 countries suffer from water shortages
- 1.1 billion people still lack access to safe drinking water and 2.4 billion lack access to improved sanitation
- Lack of safe water and sanitation results in hundreds of millions of cases of diseases, and 5 million deaths, every year
- In less than 25 years two thirds of the world's people will be living in water stressed countries

Provided by GLI Systems, Inc., June 2008

Appendix F: Social Responsibility Statements

GLI Systems Inc. Corporate Ethics and Social Responsibility

We want to be clear about how and why we do things!

Not long ago, many companies viewed business ethics only in terms of administrative compliance with legal standards and adherence to internal rules and regulations. Today the situation is different. Attention to business ethics is on the rise across the world because many companies now realize that in order to succeed they must earn the respect and confidence of their customers, not just have lofty sounding statements displayed in the outer office. Corporations are being asked, encouraged and prodded to improve their business practices through ethical behavior. Companies are being held increasingly accountable for their actions, as demand grows for higher standards of corporate social responsibility.

At GLI Systems, we go further. Defining our principles and values helps us to accomplish what we believe in. All decisions are guided by our core principles.

Our values are also the values that we desire in our customers and employees. We believe that defining what is fundamentally important to our business, making it known and behaving accordingly attracts both desirable customers and the high-quality employees we need to bring our company vision to life. We believe that our customers enjoy doing business with us because we share their values. We earn trust by putting these principles to work with every interaction. Companies may state intentions but people must carry them out. So by building our values into our systems and making them as visible as possible they become a part of our culture...not just a

statement. Our values and how they work together give us insight as to why we really exist. Knowing why we exist, instead of just what we produce, means we can take a long term view, spot risks and seize opportunities to achieve our larger vision. Here are the nine key values we embrace:

Clarity, Frugality, Honesty, Integrity, Generosity, Commitment, Humor,
Enthusiasm, and Compassion

With these core values we intend to:

Create wealth

Resources are necessary to provide good service, quality products and achieve our goals. Our decisions and actions must create value, jobs and profits.

Improve world conditions

Our decisions and actions need to be such that their affect will not impose hardships on the earth. We desire to do our part to improve the future lives of our children and the following generations.

Respect people

We are humans. Relationships that are respectful and where we protect the weak, assist the disadvantaged, listen well, tell the truth and keep commitments we create the working environment and safety we need to give our best and excel.

Think big

Dreams motivate and keep us alive. Long-term thinking helps avoid making short sighted mistakes. Creative thinking provides agility needed in fast changing business environments.

Produce quality

When we perform at our highest level we manifest the purest of human motivations, innovation. We love to do things better, faster and more efficiently and we love to be recognized for doing so.

Maintain health

Mental and physical health provides the vitality, strength and endurance needed to perform at high levels. Humor and the ability to laugh especially at one's self can be very therapeutic and will help others too.

Grow or die

In the world, organisms are either growing or dying. Growth means life but it does not always mean getting bigger. Growth is not just a financial measurement as it can come in the form of knowledge, wisdom, influence and respect as well.

Community involvement

GLI Systems is essentially a community business. We want our community and the world to know that it is richer with us than without us. We win when we get involved and when everyone knows our purpose. **Learn, Improve, Grow, Teach, Enjoy...repeat!**

Workplace conduct

GLI Systems has adopted the Workplace Code of Conduct as outlined by the Fair Labor Association and in accordance requires that its licensees, contractors and suppliers comply with this code also.

Corporate social and ethical performance goals:

We will conduct reviews and assessments of our behavior with regard to the above principles and goals then generate and publish a list of recommendations for improvement and new goals. The review will:

- Think about why we are in business. How does what we do matter and make a difference?
- Ask: who benefits from our company's success?
- Create an opportunity to talk to our employees – what do they understand is the purpose of our business?
- Discover if our values and ideas are published and freely available? Are the words as relevant as possible to our work? Is there “buy-in” from our employees?
- Ask: have our purpose and values been incorporated into our marketing strategy, recruitment and other strands of the business.
- Create brainstorming sessions to generate ideas. Involve every employee in the ‘innovation’ process. Encourage employee suggestions.
- Develop relationships with suppliers and customers and learn from their ideas.
- Provide annual ideas for opportunities to participate in local community service projects.

We look forward from this foundation towards the future.

Sincerely,

Steve L. Spratt

Edward W. Savage

Co-Founder and Vice President

Co-Founder and CEO

Provided by GLI Systems, Inc., June 2008

Appendix G: Glossary of Terms

ALGAE TOXICITY

Several Genera and Species of Green Algae found in lakes, ponds, and streams that are responsible for aquatic oxygen balance and food sources for fish are tested for their reaction to chemical exposure. Chemicals that kill algae are considered dangerous to aquatic eco-systems due to the possible food chain effects and food source depletion. Algae Toxicity is a measure of a substance's toxicity when consumed by these various types of Algae. A common measuring tool is LC50 ("lethal concentration"), which is the concentration of a substance in the water required to kill fifty (50) percent of the algae test population. If $LC50 < 10 \text{ mg/L}$, the substance is considered algae toxic.

BIOACCUMULATION

The process by which substances are stored and accumulated in the tissue or organs of humans or animals.

BIOCONCENTRATION FACTOR (BCF)

A measure of the tendency for a chemical to accumulate. The ratio of the concentration of a substance in a living organism (mg/kg) to the concentration of that substance in the surrounding environment (mg/l for aquatic systems).

BIODEGRADATION

The process by which a substance or material is broken down (or decomposed) by microorganisms and reduced to organic or inorganic molecules which can be further utilized by living systems. Biodegradation can be aerobic, if oxygen is present, or anaerobic, if no oxygen is present.

BIOLOGICAL NUTRIENT

A material used by living organisms or cells to carry on life processes such as growth, cell division, synthesis of carbohydrates and other complex functions. Biological Nutrients are usually carbon-based compounds that can be safely composted and return to soil.

CARCINOGEN - POSSIBLE, OR SUSPECTED

A known animal carcinogen, but evidence of carcinogenicity in humans is non-existent, or there is limited evidence of carcinogenicity in humans and insufficient evidence of carcinogenicity in animals (MAK 3 or TLV A3 or IARC Group 2B).

CARCINOGEN - PROBABLE

A known animal carcinogen, but carcinogenicity in humans has not been definitely proven (MAK 2 or TLV A2 or IARC Group 2A).

CARCINOGEN - KNOWN

A causal relationship has been established between exposure to the agent and human cancer (MAK 1 or TLV A1 or IARC Group 1).

CAS NUMBER

Chemical Abstract Service number. This number uniquely identifies each pure chemical compound.

CLEARANCE TIME (CT)

The CT indicates the time needed to eliminate or biodegrade a substance to a certain percentage in an organism. For example, the CT_{50} indicates the time needed to eliminate 50% of a certain substance, analogous to the half-life time measure $t_{1/2}$.

CLIMATIC RELEVANCE

This is a measure of the climate-influencing characteristics of the substance. All compounds that contribute to global warming are listed here. Examples include carbon dioxide, methane, CFCs, and sulfur hexafluoride.

CONTENT OF HALOGENATED ORGANIC COMPOUNDS

The column in the periodic chart of the elements that begins with Fluorine contains the halogens. These elements, when combined with organic compounds, form halogenated organic compounds. Most of these compounds are toxic, carcinogenic, persistent, ozone depleting or bioaccumulative, or form hazardous substances during production and disposal (e.g., PVC).

DAPHNIA TOXICITY

Water fleas of the genus *Daphnia* can be found in most ponds and streams. They feed upon microscopic particles of organic matter and are in turn food for fish and other aquatic organisms. Daphnia Toxicity is a measure of a

substance's toxicity when consumed by these water fleas. A common measuring tool for daphnia toxicity is EC_{50} ("effective concentration"), which is the concentration of a substance in the water required to immobilize 50 percent of the test animals. If $EC_{50} < 10$ mg/liter, the substance is named daphnia toxic.

DOWNCYCLING

The name for the practice of recycling a material in such a way that much of its inherent value is degraded (e.g. recycling plastic into park benches) revealing poor design of a lifecycle and the related material flows.

EFFECT CONCENTRATION 50 (EC_{50})

The median exposure concentration (EC_{50}) is the median concentration of a substance that causes some effect in 50 percent of the test animals.

ENDOCRINE DISRUPTOR

A substance that mimics, blocks, or interferes with hormones and their production, metabolism, and excretion causing malfunction of the endocrine system which can lead to malfunction of the reproductive, nervous, and immune systems.

FISH TOXICITY

Several Genera and Species of fish found in lakes, ponds, and streams that are part of the food chain are tested for their reaction to chemical exposure. Chemicals that kill fish are considered dangerous to aquatic eco-systems due to the possible food chain effects and food source depletion. Fish Toxicity is a measure of a substance's toxicity when consumed by these various types of fish. A common measuring tool is LC_{50} ("lethal concentration"), which is the concentration of a substance in the water required to kill fifty (50) percent of the fish test population. If $LC_{50} < 10$ mg/L, the substance is considered fish toxic.

HALF-LIFE ($T_{1/2}$)

The amount of time it takes half of an initial concentration of substance to degrade in the environment.

HEAVY METAL

The term "Heavy Metals" is generally interpreted to include those metals from periodic table groups IIA through VIA. The semi-metallic elements: boron, arsenic, selenium, and tellurium are often included in this classification.

IRRITATION OF SKIN/MUCOUS MEMBRANES

For the testing of skin irritation with the standard Draize test, rabbits are used. The chemical is applied to the rabbit skin and usually kept in contact for 4 h. The degree of skin irritation is scored for erythema, eschar and edema formation and corrosive action. These dermal irritation observations are repeated at various intervals after the chemical has been removed. Mucous membrane irritation is measured in a similar manner. Site-specific mechanical responses within the respiratory tract and eyes are measured, and a chemical is classified as an irritant based on the conclusions of these tests.

GLOBAL WARMING POTENTIAL

A scale used to relate a compound to the CO_2 equivalents to measure the potential heating effects on the atmosphere.

LETHAL CONCENTRATION 50 (LC_{50})

The inhalative median lethal concentration (LC_{50}) is the median concentration of a substance that causes death in 50 percent of the test animals.

LETHAL DOSE 50 (LD_{50})

The median lethal dose (LD_{50}) is the statistically derived median dose of a substance that can be expected to cause death in 50 percent of the test animals.

MATERIAL

A group of one or more chemicals that together comprise a component or input to a finished product.

MUTAGEN

This is a substance that may cause hereditary disorders in the offspring due to mutations in the chromosomes of the male or female reproductive cells. These mutations can be alterations in the structure or number of chromosomes, or nucleotide substitutions known as point mutations.

OCTANOL-WATER PARTITIONING COEFFICIENT (P_{ow})

A measure of the tendency of a chemical to partition between an aliphatic hydrocarbon system and an aqueous system. Often used as a predictor for bioaccumulation potential.

OZONE DEPLETION POTENTIAL

This is the measure of the ozone depleting characteristics of the substance. Ozone depletion in the upper atmosphere leads to an increase of UV-radiation on the earth and as a result, an increase in skin cancer. CFCs are included here.

PERSISTENCE

This is a measure of a substance's ability to remain as a discrete chemical entity in the environment for a prolonged period of time. A common measuring tool for persistence is "half-life" ($t_{1/2}$), which is the amount of time required for half of the substance to breakdown. If half-life is greater than 30 days in the air, or if half-life is greater than 50 days in soil, water, or any other media the substance is considered to be persistent.

SKIN PENETRATION POTENTIAL

A measure of the ability of a compound to assist in the absorption of chemicals into the skin.

SENSITIZATION

The ability of a substance to induce an immunologically-mediated (allergic) response.

TECHNICAL NUTRIENT

A material of human artifice designed to circulate within technical metabolism (industrial cycles)—forever.

TERATOGEN

A substance shown to cause damage to the embryo or fetus through exposure by the mother (MAK-list: Pregnancy risk group, category A).

TERATOGEN - SUSPECTED

Currently available information indicates that a risk of damage to the embryo or fetus can be considered probable when the mother is exposed to this substance (MAK-list: Pregnancy risk group, category B).

TOXICITY - ACUTE

A measure of how poisonous or "deadly" a substance is during initial exposure.

A common measuring tool for acute toxicity is LD_{50} ("lethal dose"), which is the dose required to kill 50 percent of the test animals. If $LD_{50} < 200$ mg/kg, the substance is named acutely toxic.

TOXICITY - CHRONIC

This is a measure of how poisonous a substance can become over time with repeated exposure. A substance may have low acute toxicity (i.e., little harmful effects from the initial exposure) but may become poisonous over time with repeated exposure. This may be due to accumulation of the substance or due to repeated minor damaging of target organs.

Resources and Works Cited

American Conference of Governmental Industrial Hygienists. 2003 TLVs and BEIs, Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices. ACGIH Worldwide 2003.

CAL PROP 65, California Proposition 65 list of Carcinogens and Reproductive Toxins.
http://www.oehha.org/prop65/prop65_list/Newlist.html

CCRIS, Carcinogenicity and mutagenicity data. (Chemical Carcinogenesis Research Information System, National Cancer Institute) <http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?CCRIS>

ChemID Plus, Detailed structure data by CAS number. (National Library of Medicine)
<http://chem.sis.nlm.nih.gov/chemidplus/setupenv.html>

DART/ETIC, Developmental and Reproductive Toxicity/Environmental Teratology Information Center- Literature (bibliographic & abstract information) on developmental and reproductive toxicology. (National Library of Medicine).
<http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?DARTETIC.htm>

Eco-Tox, Environmental toxicity database. (Environmental Protection Agency) <http://www.epa.gov/ecotox>

EFDB, Environmental Fate Data Base. <http://esc.syrres.com/efdb.htm>

EMIC, Environmental Mutagen Information Center. (bibliography and abstracts)
<http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?EMIC>

Fisher-Acros MSDS. [http://www.fishersci.ca/homepage2.nsf/\(waSearch\)?openagent&lang=E&DB=msds.nsf](http://www.fishersci.ca/homepage2.nsf/(waSearch)?openagent&lang=E&DB=msds.nsf)

GENE-TOX, Mutagenicity data. (Environmental Protection Agency)
<http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?GENETOX>

Hazardous Substances Data Bank (HSDB), A comprehensive source for toxicology data for relevance to Human Health. Peer- reviewed. (National Library of Medicine). <http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB>

IARC (International Agency for Research on Cancer). A list of chemicals that have been evaluated and classified by IARC as to carcinogenic risk to humans. <http://193.51.164.11/monoeval/grlist.html>

IUCLID, International Chemical Information Database (IUCLID). 2000. (European Commission, European Chemicals Bureau) <http://ecb.ei.jrc.it>

List of Ozone Depleting Substances. (Environmental Protection Agency) <http://www.epa.gov/ozone/ods.html>

LogKOW Estimation, Environmental toxicity database. (Environmental Protection Agency)
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