EMERGING CONTAMINANTS

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Final Report
Emerging Contaminants: Linking Science to Effective Action
HEALTHY RIVERS FUND
November 2010

Introduction

Project Overview

With the assistance of the Healthy Rivers Fund, the Institute for Environmental Solutions (IES) began a pilot program in Golden, Colorado, to evaluate community education as a method for preventing the entry of emerging contaminants (ECs) into wastewater, thus reducing their concentrations. The project focused on meeting two major goals: to reduce the amount of ECs that people contribute to local waterways and to increase citizen awareness about ECs.

Many ECs are known or suspected toxins or endocrine disruptors, meaning they interfere with the normal function of hormones, and may be linked to mutations in aquatic organisms, other biological abnormalities and human health risks. Traditional wastewater treatment does not effectively remove ECs, but allows their release into the environment even after water has been treated. Scientists have not yet characterized what level of exposure to these suspected toxins and endocrine disruptors is harmful to humans.

IES has used education and community-based social marketing (CBSM) to reduce and prevent the introduction of household and personal care EC byproducts to Golden's wastewater. This pilot program has included chemical analysis of Golden's wastewater, community member surveys and educational outreach. Regional and local stakeholders and the scientific community have collaborated on the project through the project Steering Committee to guide the project, and a community stakeholder group to disseminate project information.

The educational campaign was designed to teach citizens about the source, fate and impacts of toxic chemicals in household and personal care products and to provide reasonable non-toxic alternatives to facilitate behavioral change. Throughout the pilot program IES developed a numerous educational materials, such as fact sheets, posters, education guides, wallet cards, and refrigerator magnets. These materials supported a wide variety of community outreach including a series of community workshops.

In conjunction with water sampling, IES conducted scientific community surveys before and after the education campaign to measure changes in awareness and behavior. Raw wastewater

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samples were taken upstream of the treatment plant and sent to the U.S. Environmental Protection Agency (EPA) Region 8 laboratory to be analyzed for ECs. This sampling occurred both before and after the educational campaign to evaluate changes that may result from education. IES also sampled and analyzed Golden drinking water samples (at the EPA lab) to determine the background levels of ECs entering the city.

Healthy Rivers Fund October 2010 Final Report Role

This final report describes the EC pilot project's completion of the objectives set forth in the initial grant application (April 2008) in the grant period from February 2009 through October 2010.

The major tasks of the EC project, outlined in the scope of work document:

1. **Background research**
2. **Assemble and convene Steering Committee and Stakeholder Group**
3. **Water sampling**
4. **Surveys**
5. **Community education**
6. **Analysis of surveys and samples**
7. **Reporting and evaluation**
8. **Policy and education**

Further explanation of completed tasks and the EC project's achievements is provided below.

Note

Terminology: The project was originally called "Emerging Contaminants" (or ECs). In July 2009, the project title was changed to "Contaminants of Emerging Concern" (or CECs) to be more accurate. Both terms are used in this report, and refer to the same project.

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1. Background research

Role

IES's background research began with determining the ECs on which to focus the education campaign. University and government research databases were examined for all applicable research, a task that became more difficult than expected due to a lack of objective scientific analysis of ECs and their effects. IES's background research resulted in the realization that the pilot project needed to focus on ECs that people use frequently and are washed down drains into wastewater, instead of trying to mitigate chemicals that do not appear frequently in everyday household products.

Accomplishments

Research on contaminants resulted in a selection of 27 ECs for further research, and a short list of 12 ECs:

- Atrazine – herbicide
- Benzophenone – UV-blocker; preserves colors and scents in personal care products
- Bisphenol A (BPA) – food preservative
- Butylated hydroxyanisole (BHA) – plasticizer; in hard plastic water bottles, epoxy can linings
- Caffeine – stimulant
- DEET – Insect repellant
- Methylparaben – antifungal used as preservative in foods and PCPs
- Musk ketone – artificial fragrance; in lotions, soaps, perfumes, detergents
- N-butylparaben –fragrance ingredient in cosmetics, preservative, and masking
- Nonylphenol – surfactant in detergent, personal care products
- Octylphenol – surfactant in detergent
- Triclosan – antimicrobial agent; in antibacterial hand soap, toothpaste, toys

These 12 ECs would be the focus of the education and outreach campaign. Narrowing the target ECs from several hundred candidates to 27 to 12 was based on the following criteria:

- Clear pathway from use to wastewater treatment plant
- Release into the environment can be affected by behavior change
- Community source well understood
- Detectable in high enough concentrations to be scientifically valid
- Easy to analyze
- Unaffected by seasonality
- Cost-effective to analyze

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- Untreated by wastewater treatment plant (WWTP)
- Relatively unaffected by ambient conditions

IES produced an EC guidebook that includes extensive details of the ECs measured in Golden's wastewater. For each EC, the guidebook describes:

- Its chemistry
- Where it is found, i.e. products and uses
- Regulatory information
- Documented effects on human health, wildlife and environment
- Non-toxic alternatives

The Guidebook covers the following subjects:

- Sources and Environmental Fate of CECs
- Effects of CECs
- Municipal Wastewater Treatment
- Legislation / Regulation
- Prevention and Mitigation

Note

The scope of this research effort turned out to be far more vast than originally thought at the time of the project proposal, and is continually increasing at a rapid pace. As IES is committed to sound and accurate scientific research and communication, the resources required to complete this task were far greater than funded through the Healthy Rivers Fund grant. IES is making up the difference through individual contributions to IES along with generous volunteer efforts.

Post-Pilot Program Plan

Continue compiling, reviewing, and integrating research on the target ECs.

Attachments

- EC Guidebook
- EC Project Target Contaminants

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2. Assemble and Convene Steering Committee and Stakeholder Group

Role

IES organized a steering committee to engage representatives from a wide range of industry, business, academia, government (local, state, federal), and community representatives. The EC Steering Committee guides the EC project team by providing the project with guidance, expertise, resources, and feedback. We have held bi-monthly meetings to update the committee on the project and to request guidance.

The Stakeholder Group is a group of diverse individuals and organizations that have expressed interest and recognize their stake in the EC project. Stakeholders include residents, teachers, city staff members, and business and community leaders both in Golden and communities downstream, as well as the metropolitan area. Researchers and others with interests in the project from across the country were also included.

Accomplishments

- Formation of Steering Committee
- Held eleven Steering Committee meetings with great turnout and interest. Meetings were held every 2 months.
- Stakeholder Group established and open for expansion
- Hosted, organized, and presented at the Colorado Environmental Partnership's workshop titled *Emerging Contaminants: Threats to Colorado's Water Supply* on April 30, 2009. This served as a major outreach to stakeholders.
- IES presented EC project information to community members at the Consortium for Research and Education of Emerging Contaminants meeting on June 11, 2009 at the Colorado Department of Public Health and Environment.
- Quarterly newsletters providing detailed updates on the EC project have been sent out to Stakeholders since December 2008.
- Stakeholder workshops were organized along with e-mails, printed fliers and publications for community outreach.

Post-Pilot Project Plan

As an ongoing part of this task, IES will:

- Continue with bi-monthly Steering Committee meetings (or as appropriate)
- Continue quarterly electronic newsletter updates to all Stakeholders
- Continue to send electronic, print, and media updates to all Stakeholders

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Attachments:

- Roster of Steering Committee
- Agenda of each Steering meeting
- April 2009 Workshop agenda
- August 2009 IES EC Presentation to the 2nd International Conference on ECs

3. Water sampling

Role

IES, with the support of City of Golden chemists, collected samples of untreated municipal wastewater from the City of Golden before and after the education campaign to measure changes in levels of the target ECs that resulted from the outreach efforts and community education about ECs. IES also took samples of the drinking water entering Golden to demonstrate that ECs measured in the wastewater originated in Golden, contributed to the municipal wastewater by the citizens of Golden.

The EPA Region 8 laboratory donated water analysis services. Colorado State University and the EPA Region 8 laboratory developed methodologies to analyze water samples for ECs in levels as low as 10 parts per trillion (ppt). An initial screening sample was analyzed under the supervision of Colorado State University to determine the range of contaminant concentrations and what contaminants were detected. The advantage of the method eventually developed is that the only sample preparation required is filtration. The EPA Region 8 laboratory used the water and wastewater samples of IES EC project to fine-tune the new method, with all data verified for accuracy with more traditional methodologies. In addition to the target ECs, the EPA lab measured over 100 compounds including pesticides, pharmaceutical products, and non-prescription drugs.

The project Steering Committee was actively involved in all aspects of this task.

Accomplishments and Completions

- Determination of sampling schedule and plans
- Collection of screening samples, “before” wastewater samples, drinking water background samples, and “after” wastewater samples
- Collaboration with Colorado State University, Department of Environmental Chemistry, and U.S. Environmental Protection Agency (EPA) Region 8 Laboratory

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- Establishment of state-of-the-art methodologies based on Liquid Chromatography/Mass Spectrometry and Gas Chromatography/Mass Spectrometry to analyze wastewater and drinking water for trace contaminants
- Wastewater screening sample chemical analysis and review
- Refinement of sample collection methods and procedures
- Refinement of comprehensive sample analysis procedures

Post-Pilot Project Plan

The original agreement among the Institute for Environmental Solutions, Colorado State University and the U.S. EPA Region 8 Laboratory included final completion of 2009 wastewater sample analyses in July 2009; final completion of Spring 2010 wastewater and drinking water sample analyses in July 2010; and preliminary completion of Fall 2010 wastewater sample analyses in October 2010. To date (November 15, 2010), EPA has completed only preliminary analysis of Spring 2009 and Spring 2010 samples due to unforeseen internal problems at EPA. The 16-month delay in analysis of the Spring 2009 samples has raised unanticipated questions regarding the stability of samples over unusually long hold times.

To address the questions related to long hold times, IES has arranged with EPA to conduct an 18-month Hold Time Study, starting in December 2010. The results of this investigation will be extremely valuable to chemistry researchers around the world, as this information has not yet been established.

The majority of all the findings developed and generated by this entire investigation is new, and have been achieved because this project tackled necessary challenges that have never been addressed.

EPA has committed to supplying the preliminary analytical results for the Fall 2010 samples later this month. Thus, with preliminary results for all the sample sets, IES will complete preliminary source contribution analysis.

Once EPA completes the analyses and reports as promised, the results will provide fantastic baseline data that can be analyzed relative to social behavior. This "community profile" has never been looked at. This data collection will establish an important benchmark as many of the target compounds become controlled and regulated.

Note

The scope of this research effort turned out to be far more vast than originally thought at the time of the project proposal. Significant delays of up to 18 months at the EPA Laboratory have eaten

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up and continue to consume limited project resources. As IES is committed to sound and accurate scientific research and communication, the resources required to complete this task were far greater than funded through the Healthy Rivers Fund grant. IES is making up the difference through individual contributions to IES along with generous volunteer efforts.

In addition, the extra work required to manage the delays has caused delays in completion of every other project task.

IES recognizes that all aspects of this investigation involved breaking new ground, and thus took longer than originally planned.

Attachments

- Summary – Screening Sample Analysis
- EPA Region 8 Laboratory methodologies

4. Focus Groups and Surveys

Role

The objective of this task was to hold focus groups and survey Golden residents on quantities and types of pharmaceuticals and personal care products used, taken, and disposed of. The collected information would be used to design prevention strategies that target the ECs that our analysis and current scientific literature indicate are the most pressing and preventable. Both "before" and "after" surveys were identical except for additional questions in the post-education campaign survey asking whether the respondent participated in an IES-sponsored education event or outreach. The first survey was 24 questions long, took about 10 minutes to complete, and was designed with the guidance of Professor Daniel Kaffine, Division of Economics and Business, Colorado School of Mines. The goals of the surveys were to:

- Determine specific indoor EC usage, including personal care products, household chemicals, and certain food products.
- Identify areas in which people are unaware of their impacts.
- Summarize the chemical impact of residents in Golden.

In addition to these goals, we planned to use the insight gained to plan the most effective education campaign possible.

The first survey was conducted at Golden community events in which an IES team member did most surveying one-on-one. IES surveyed 341 Golden area residents. Starting in August 2010, surveys were completed with the purpose of measuring changes in community awareness and behavior after the education campaign.

Focus Groups and In-Depth Interviews

The purpose of the EC project focus groups and In Depth Interviews (IDIs) as part of the social analysis is to inform specific themes and messages that will appear in the education and outreach campaign, and then to test those themes and messages once they have been refined. This initiative provided IES with the chance to have in-depth discussion with community residents regarding their perceptions and present behaviors relevant to personal care product and household chemical use.

IES conducted before the survey initiative and before the education and outreach campaign, to inform the creation of educational themes and messages. "Focus groups are best used when the concept or idea you wish to evaluate is new and when the best evaluation comes from letting the target customer view the concept directly." (Edmunds, 3).

A. GOALS OF FOCUS GROUP

Focus groups are a qualitative form of research. The questioning methodology is less structured than surveys, and the answer range is more open. These focus groups were conducted to answer questions that pry deep into people's motivations for using and buying a certain nature of personal care products and household chemicals so that effective education and outreach campaign messages and strategies could be formulated. For example, *why* do citizens do what they do when it comes to purchasing and using personal care products? *Why* do citizens habitually buy toxic household chemicals? IES developed information acquisition goals for the first focus groups. In creating the Discussion Guide[1] for focus group conversation, IES developed the following points as guidelines:

- Citizens' underlying motivations for purchasing and using personal care product and household chemicals.
- How much people know about their water resources.
- Where the participants have picked up information regarding the environment.
- Where the participants have picked up their water knowledge.
- Where people in Golden get their information.

[1] Discussion Guide: Also called a 'Moderator's Guide', is an outline that the moderator follows while conducting the focus group. It ensures that the focus group discussion thoroughly covers all the necessary topics. (Edmunds, pg 50).

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B. GOALS OF THE IDIS

IDIs are also qualitative. IDIs are a qualitative research method used for targeting "a priori" target segments. The depth and range of behavior can be investigated before quantitative studies are conducted (*Market Research Tools: Qualitative Depth Interviews*, n.d., para. 1). IDIs are an intimate and permissive way of relating to people, that differ from focus groups because all third party influence is eliminated. The goals of the EC project IDIs mirror those in focus group 1. Questions were slightly altered to be appropriately asked on an individual basis.

Discussion

FOCUS GROUPS

A. BACKGROUND AND DEMOGRAPHIC

The focus groups involved collaboration with the social marketing research firm, Groundwork Research from Boulder, Colorado. Groundwork Research professionals assist organizations such as IES with focus group Discussion Guide design, leading focus group conversations, and completing data analysis (www.groundworkresearch.com).

Targeting specific demographic for focus group participants was imperative to the success of the focus groups. If focus group demographic is not streamlined, then overall conversation, and thus data collection and results are skewed. The education and outreach campaign will first be geared towards 1) head of household and 2) mothers of young children; so these were the categories deemed for focus group participant recruitment. A brief survey to record more specific demographics of focus group participants was administered in the introduction to the focus group.

B. LOCALE

The scene of the focus groups was grassroots. At first, IES searched for a professional focus group center, which involves the use of one-way mirrors, video recording equipment, and microphones to record conversation. Time, budget constraints, and re-evaluation of focus group goals led EC team members to focus on securing a local, free, and simple venue in which to hold the focus groups.

Clear Creek Books is an independently owned bookstore in the heart of Golden, Colorado. The owner of this bookstore supports the mission of IES, and the methods by which IES reaches a local community. The bookstore owner is tightly linked into the community because he knows

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many people on a first name basis, he is aware of community events taking place, and he supports community-enhancing activities. He volunteered to help recruit focus group participants within the EC demographic requirements.

IES originally fostered a relationship with Clear Creek Bookstore with the intent to reach a group of mothers of young children. The bookstore has reading groups for little children every week, so the idea to hold a focus group with mothers, perhaps while a reading group was taking place. This idea did not come to fruition, but in the process, a relationship was established with the bookstore owner.

Focus groups were held in a small reading area in the back of Clear Creek Bookstore. Lyn Ciocca and Monica Emerich, co-founders of Groundwork Research, guided discussion. Lyn was the primary moderator. Focus group participants sat in a semi-circle, facing the moderator, while IES Research Associates sat behind them for observation purposes. Each focus group lasted about one and half hours.

C. METHODS

Methodology was created for recruitment of participants, creation of the discussion guide, acquisition of incentives, and data collection. The focus groups were divided into four sections. Two days, each with two focus groups per day, were set aside. Time slots were chosen to coincide with before dinnertime, or early evening. The groups with Young Mothers were put first in the evenings, and middle-aged participants, second as convenience appeal.

1. Recruitment

Recruiting members to participate was a two-week process. The first step was creating a screener. The typical purpose and use of a screener is to eliminate possible focus group participants that would not be relevant to the study. Often, a questionnaire is sent out to a number of contacts, and people are eliminated from or incorporated into the study based upon how well they fit the guidelines. IES and Groundwork Research met to discuss the qualities of a desired focus group participant audience, and how responses from this audience would positively impact the project goals.

Screener prerogatives were then used to create an invitation flier which advertised the Focus group initiative to target audiences. This flier also outlined the relevant foci of the EC study. The fliers were disseminated throughout the City of Golden, largely to local businesses to post. The flier refers interested participants to contact either Clear Creek Bookstore or an IES associate to get involved. IES also used personal and Institute contacts to help recruit Golden

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citizens who fit into the screener guidelines. A sign-up sheet was dropped off at the Clear Creek Bookstore so that interested people could sign up.

2. Discussion Guide

The focus group discussion was guided by a Discussion Guide, created collaboratively by IES and Groundwork Research. Focus group goals were worked into a comprehensive questionnaire that was verbally conducted to focus group participants. To start, IES pulled together a "top 10" list of questions that needed to be answered, and topics to be covered by the focus groups. Groundwork Research then worked this list into a fluid discussion, which was scripted in the Discussion Guide. As Edmunds states clearly in her book, The Focus Group Research Handbook, "[focus group] methodology is exploratory, with its intent being to provide an understanding of perceptions, feelings, attitudes and motivations".

3. Incentives

Typically, focus groups initiatives give participants monetary compensation. For this project, IES decided that the most cost effective compensation for focus group participants would to be environmentally–friendly personal care products or local non-toxic household products.

To obtain these products, IES tapped resources in and around the City of Golden. *The Downtown Merchants Meeting* is a gathering of local merchants in the City of Golden who like to connect and promote their businesses at events run by the Golden Chamber of Commerce. IES attended a meeting and asked local merchants for donations in the form of coupons, products, or services. Two merchants volunteered; *Golden Bodyworker*, a holistic wellness center, donated a half hour massage; and *Windy Saddle Coffee Shop*, a local café, donated a $15.00 gift certificate. These donations were awarded to focus group participants via a drawing.

IES also contacted local organic product manufacturers asking for sample-sized donations. Of the half dozen contacted, *Mountain Girl Botanics*, and *Pangea Organics* volunteered to donate sample products in the name of the EC project. A bar of organic soap and a bottle of organic liquid hand soap from *Mountain Girl Botanics* and from *Pangea Organics*, respectively, were given to each focus group participant.

4. Data collection

Data collection techniques for the focus groups involved:

1. An audio tape recorder
2. Observational notes
3. A mini-survey, a.k.a the demographics survey

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All focus groups were recorded, and IES associates sat behind the focus group participants to take observational notes on facial expressions, voice inflections, or gestures that may not be recorded by the audio tape recorder.

The quantitative questionnaire obtained basic demographic information from the focus group participants. The questionnaire was a mini-survey. This was imperative to data collection because it provided specific information of our "target audiences", which could be referred to when analyzing data points. The questionnaires were administered briefly before the focus group discussions were started. A benefit to obtaining this information from a questionnaire, opposed to incorporating it into the Discussion Guide, is confidentiality.

5. Data Analysis

Recruitment efforts for the focus groups only yielded enough participants for two focus groups, instead of the anticipated four groups. IES hoped to have two groups of mothers of young children, and two of middle aged adults. In the end, we only had one of each. These groups still provided enough information for IES to utilize.

<u>IDIS</u>

A. BACKGROUND AND DEMOGRAPHIC

In depth interviews were conducted by IES Research Associates. Monica Emerich, of Groundwork Research, prepared a comprehensive list of IDI techniques, a set of guidelines for conducting an objective, in depth interview.

Streamlining a demographic for in depth interviews is relatively easy. Fewer requirements for IDI demographics are needed than for focus groups because conversations are one on one, and so participants are independent from the opinions and personalities of others while speaking.

Demographic questions incorporated into the IDI Guide:

- Number of people living in the household.
- Is their home owned or rented?
- Length of Golden residence.

These demographic questions are indicators for other information. Number of people living in a household informs IES to the overall impact of a household with their size. The "own or rent" question informs IES to the income bracket of an interviewee. Length of Golden residence informs IES as to how intrinsic the interviewee's points of views are to the City of Golden.

B. METHODS

1. Recruitment

Recruiting people to participate in the in depth interviews involved getting in touch with as many contacts and as many contacts of contacts as possible. This started with a preliminary list made up of contacts from:

- The Golden Pride Day pharmaceutical round up
- Focus groups
- Associates and friends

A spreadsheet was assembled to keep track of all the emails, phone numbers, and names. Whenever a contact was called, the contact was recorded in the spreadsheet, and IES asked who else they knew who may be interested in participating in an IDI.

2. IDI Guide

The IDI guide is a consolidated version of the Focus Group Discussion Guide. Any questions which proved to be obsolete or superfluous after the focus groups were eliminated, and a concise, 30-minute guide is the result. IES and Groundwork Research were in agreement that any over-the-phone survey exceeding 30 minutes would be difficult to convince people to participate.

3. Data Collection

While surveys were conducted, all participant answers were scribed by research associates. Answers were labeled with the date and time that the interview was conducted, and the interviewer's name. It was not necessary to include the name of the interviewee.

References

Edmunds, Holly. (1999). *The Focus Group Research Handbook*. Chicago, Illinois: NTC Business Books and The American Marketing Association.
Market Research Tools: Qualitative Depth Interviews. Retrieved October 1, 2009, from Power Decisions Group. Website: www.powerdecisions.com/qualitative-depth-interviews.cfm

COMMUNITY SURVEYS

The purpose of the EC survey initiative is to evaluate the effectiveness of the education and outreach campaign based on the chemical impact of Golden citizens. Collecting surveys enables IES to evaluate the chemical impact and EC awareness levels of Golden citizens, before and after the education and outreach campaign.

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How is it possible to understand the personal care product and household chemical use habits of an entire representative community? How, in turn, is it possible to 'recognize' which habits are subject to change by way of education? The survey initiative addresses these questions by way of collecting quantitative information.

A. GOALS

The EC pilot survey design is two-fold. There will be an initial survey and a final survey. The surveys are administered before and after the EC education and outreach initiative. The purpose of this is to quantify changes in EC awareness levels. Comparing initial and final awareness levels of Golden citizens allows IES to evaluate the efficacy of the education and outreach initiative.

The goals of the pilot surveys are to:

- Determine specific indoor chemical usage, including personal care products, household chemicals, and certain food products.
- Understand areas in which people are uneducated about their impacts.
- Summarize the chemical impact of residents in Golden.

Survey analysis may reveal purchasing patterns and lifestyle habits that allow for chemical footprint reductions; IES can then target education and outreach initiatives based on these results.

The final survey is the same design as the initial survey, with additional questions that address and weigh responses from people who may have been influenced by water or chemical related issues extrinsic to the EC education and outreach initiative. The results of the final survey render IES with a valid barometer for change, and allow quantification of the effectiveness of community based social marketing (CBSM) as an education tool.

B. THE SURVEY AND THE EC PROJECT

The EC project tightly intertwines the education and outreach campaign with the survey initiative and wastewater sampling. CBSM is used for the education and outreach campaign. Initial wastewater samples were taken to determine chemicals present in the wastewater. These sampling results will serve as a baseline for chemical presence in Golden wastewater, representing the pre-education campaign environment. The initial survey's analysis informs the education and outreach campaign by highlighting chemical awareness that people are and are not well versed on, habits that may be easy to change, habits that may be difficult to change, habits that do not need to be changed, and audiences would be most receptive to target. Effectiveness

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of the education and outreach campaign is determined by habitual changes reflected in the final survey, and in chemical levels found in final wastewater sample analysis.

CBSM is a strategy that aims at uncovering the barriers and benefits for why people engage in certain sustainable activities (Mohr, 19). The CBSM model is in sync with the EC education and outreach initiative because it provides framework for understanding peoples' personal motivations for using items which contribute to the EC problem. If IES can understand people's motivations, and can uncover the benefits and barriers to changing the norm associated with these motivations, then the messages of the education and outreach campaign can be geared towards effecting this change. All parts of the social analysis; surveys, focus groups, and in depth interviews, contribute to IES' understanding of motivations, norms, barriers, and benefits within the Golden community. CBSM is described more in depth in the education and outreach chapter of this report.

The EC social analysis included focus groups and in-depth interviews. Surveys differentiate from focus groups and in-depth interviews because they gather information from a broader demographic. Initial survey analysis will serve IES with a general overview of citizen habits and habits with the potential for positive change. Specific demographics to target with education will become apparent in survey analysis. Then the final survey will serve as the barometer of change; we will be able to see changes that have taken place from education strategies and initiatives.

Focus groups target specific demographics that IES has hypothesized to be most sensitive to the EC issue; mothers of young children, and middle aged adults. Focus group questions are designed to explore influences that affect the psyche of these people and motivation for actions that contribute to the EC problem. This is anything from response triggers and information acquisition, to habitual behavior, to EC knowledge. It is analysis of the focus groups that will help IES create specific educational messages.

In depth interview (IDI) questions mimic those in focus groups. IDIs differ because they are more intimate and do not target any demographic. Interviews are conducted solely between the interviewer and the interviewee over the telephone. Answers are generally more honest and streamlined because there is not a group of people for the interviewee to talk over, with, or against. IDI analysis will reflect virtually the same information as the focus groups, only more in depth.

Initial survey administration took place August to September 2009. Final survey administration took place August to November 2010.

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SURVEY METHODS

A. SURVEY CREATION

The EC survey was created with guidance from the book *Internet, Mail and Mixed Mode Surveys,* by Don A. Dillman. The book helped guide IES with a holistic approach to crafting the most effective questions for mail, in person, and internet surveys. The surveys are made up largely of closed-ended questions with an ordinal scalar response structure. This design allows survey participants to rank themselves with quick responses. There are a few open-ended questions in the survey as well. The open-ended questions are used to obtain information revealing specific product use. The anatomy of each question was dissected to use simple, familiar words, to be short and easy to understand, and to have a positive nature. IES aimed to obtain the most unbiased answers as possible. The survey eliminated references to the environment, where possible, and ordered non-personal questions towards the beginning; so as not to deter people from continuing to the latter, more in depth and personal questions. This method is called the leverage-salience theory of survey response, and was developed by Groves, Singer, and Corning (2000). They proposed that "respondents in interview surveys are differentially motivated to respond to different aspects of the survey (i.e. leverage) and by how much emphasis is put on each aspect by the surveyor (i.e. salience)…[questionnaires can be made more interesting by] ordering questions so that more engaging ones are placed early in the questionnaire…" (Dillman, 21, 25). Finally, the survey was not printed on IES letterhead, and project icons were deliberately eliminated from the survey.

The following steps were taken to move through survey creation and administration:

- Background research of survey layout and question creation (Dillman, 65 - 165)
- Consultation with Dr. Andy Bardwell, statistician, to link survey questions to the EC project questions and goals
- Consultation with Dr. Daniel Kaffine, Colorado School of Mines; linking questions to methods of statistical analysis
- Survey design
- Pilot survey review by the EC steering committee
- Identification of survey administration venues
- Survey administration
- Expansion of the universe for survey administration
- Establishment of an online presence
- Survey analysis
- Conclusions

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B. DATA COLLECTION

Based on background research and discussion with experts, IES worked the following ideas into the survey:

- Survey confidentiality
- Reassurance that local water resources and drinking water are not contaminated
- A streamlined questionnaire; to obtain the greatest number of truthful answers
- Bias elimination, by phrasing questions *without* an environmentally conscious edge
- Options to take the survey home by making it mail-able and available online

Demographics collected:

- Gender
- Age
- Primary shopper in the household
- Number of people residing in the household
- The age of each child under the age of 18 residing in the home
- Highest level of education
- Household income
- Golden residence

Limiting the survey to people who were residents of Golden was imperative to final analysis and comparison of social and field data. Survey results can only correlate with wastewater sample results if all could be tied to citizens of the City of Golden.

Dependent variables in the survey were:

- Type of chemicals used
- Frequency of chemicals used
- Awareness of chemical use
- Willingness to change a product based upon environmental improvement incentive
- Lack of willingness to change a product based upon economic incentive

The original survey design, of both the initial and final survey, incorporated questions regarding the use and disposal of pharmaceutical products. These questions were eliminated, as the entire EC project scope was narrowed to focus in-depth on the identification of habitual personal care product and household chemical usage; to educating citizens on changing habits, and then resurveying to identify efficacy of education initiatives. This shift in project focus allowed survey administration techniques to open up and be more of a creative process.

C. SURVEY ADMINISTRATION

1. The Survey Population

The survey population is residents of Golden. The sample frame[2] was created by utilizing IES stakeholders and business contacts. IES was granted permission to administer surveys at a variety of City events and at local businesses. Coverage error was avoided by administering surveys at Golden locations which carried a mixed demographic, and by randomly distributing the survey link. Coverage error occurs when every unit in the survey population does not have a known, non-zero chance of being included in the sample (Dillman, 43).

Consultation with statisticians led IES to a goal of acquiring 300 to 500 surveys, a range which would allow for IES to account for sample error in survey analysis. Distributing the surveys to 1,000 citizens was necessary to account for non-response, which is generally 50 – 70%. Surveys were collected by the following methods:

- In person
- Mail
- Local business participation and collection
- Online

To obtain surveys that would be filled out in their entirety, it was deemed that conducting the surveys in-person would be most efficient. The Golden Chamber of Commerce made it possible for IES to administer surveys at the local Farmers Markets on Saturday mornings in August and September. To reach a greater population, the EC gained permission from Meyer Hardware to administer surveys on a Saturday afternoon. IES was also granted permission from King Soopers' regional administrative offices to administer surveys for three consecutive days outside of the Golden King Soopers. For all venues, IES aimed to be present during high traffic or peak shopping times.

The last push for in-person survey administration was the Golden 5K run event, which took place in the beginning of October. This was an event run by the Golden Community Center. IES was granted a booth at which to administer surveys.

IES dropped stacks of 50 surveys off at the Clear Creek Bookstore, Meyer Hardware, and Windy Saddle Coffee shop. These were accompanied with a survey advertisement flier, encouraging citizens to volunteer their time to help our research initiative by completing a survey. These surveys were mailed back to IES by survey participants. A stack of 50 surveys was dropped off at Golden's Calvary Episcopal Church as well. The church advertised the EC project in parish

[2] Sample frame: The list created for the survey to be drawn in order to represent the survey population (Dillman, 43).

newsletters, and volunteered to collect any completed surveys in an envelope for IES.

The survey was posted online via survey-monkey, www.surveymonkey.com. To advertise, the link was posted on the tops of all distributed surveys and distributed via email to all EC Steering Committee members; IES Board members, associates, and volunteers; a professor-colleague at Colorado School of Mines, to electronically distribute to his students.

2. Using Psychological Models of Survey Response

When administering surveys in person, it is important to keep a number of psychological models of administration in mind. These models provide guidelines for a surveyor to reduce bias in their subject, thus reducing error. Here, the salience-leverage theory was taken into account once again. IES briefed volunteer survey administrators on how to maintain salience with the interviewee. Social exchange theory maintains that survey participants are more likely to participate in a survey if they are presented with a benefit for participation. Economic incentive is a viable option, but on the other hand, it is difficult to define because people view economic incentives very differently. IES cut costs by not providing a tangible incentive, and still established trust with interviewees by using the following methods:

- Provide information about the survey
- Sponsorship by a legitimate authority; "IES is collaborating with the City of Golden…"
- Provide social validation; letting people know that other "Golden residents" were taking the survey too
- Make it convenient to respond, saying that the survey would take about two minutes of their time
- Avoid subordinating language
- Say Thank you

3. Survey Volunteers

IES is modestly sized as an organization, and so needed to recruit the help of volunteers to administer surveys. Messages were sent out to the entire stakeholder and steering committee network. This method garnered an average of one to two volunteers per survey administration session. Volunteers were always accompanied by an IES associate during survey administration. Before attending survey administration, volunteers were emailed handouts. One outlines salience theory, and the other debriefs volunteers on directions, dress code, etc. to survey administration. Each volunteer received a custom Contaminants of Emerging Concern baseball cap as gratitude for helping IES.

D. Data Analysis

Data analysis will:

- Relate survey demographics with dependent variables

- Reflect the efficacy of the survey design
- Reflect the efficacy of survey administration techniques.

References

Mohr, Doug McKenzie-Mohr. (2008). *Fostering Sustainable Behavior*. Gabriola Island, BC, Canada: New Society Publishers.

Dillman, Don A. (2009). *Internet, Mail, and Mixed-Mode Surveys: The Tailored Design Method, 3rd Edition*. John Wiley and Sons, Ltd.

Accomplishments

This pre- and post- education campaign surveys of this task are complete. IES has:

- Partnered with a market research firm to advise this major task on a *pro bono* basis
- Formed focus groups and recorded resulting feedback for education campaign
- Designed and conducted the survey
- Designed and executed interviews to obtain in-depth knowledge of community levels of awareness and behavior motivations to be employed in designing education campaign
- Took the following steps for survey creation and administration:
    - Background research of survey layout and question creation (Dillman, 65 - 165)
    - Consultation with Andy Bardwell, statistician, to link survey questions to the EC project questions and goals
    - Consultation with Dan Kaffine, Colorado School of Mines; linking questions to methods of statistical analysis
    - Survey design
    - Pilot survey review by the EC steering committee
    - Identification of survey administration venues
    - Survey administration
    - Expansion of the universe for survey administration
    - Establishment of an online presence

Post-Pilot Project Plan

Upon analysis of post-outreach survey results and comparison to those administered prior to the education and outreach campaign, and analysis of these data in conjunction with results from water sampling, the EC Pilot Project team will complete evaluation of the education and outreach efforts. If no statistically significant differences are found, the EC team will evaluate its education and outreach campaign in the interest of improving the impact of its message. If statistically significant differences are discovered, IES will anticipate dissemination of its EC campaign to additional, larger communities.

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Attachments
2009 Community Survey
2010 Community Survey

5. Community education

Role

Our education and outreach campaign emphasized the importance of individual choices in contributions of ECs into the waterways. IES provided information on choices that can reduce household output of ECs, such as how and why to select products that do not contain chemicals of emerging concern. The education and outreach campaign was designed to educate the citizens of Golden about simple behavior changes they can make to effect real improvements in water quality. The goal of this program was to increase awareness about ECs and all surrounding issues.

IES adopted a framework of social marketing called community-based social marketing (CBSM) (Fostering Sustainable Behavior: An Introduction to Community-Based Social Marketing, McKenzie-Mohr and Smith), combined with traditional community outreach methods. CBSM provides a number of tools and strategies that have been demonstrated to be effective in changing behavior. "Numerous studies document that education alone often has little or no effect upon sustainable behavior," according to McKenzie-Mohr and Smith, and that "There is often little or no relationship between attitudes and/or knowledge, and behavior." The effectiveness of CBSM is due to its pragmatic approach, which involves: identifying barriers to a sustainable behavior, designing a strategy that utilizes behavior change tools, piloting the strategy with a small segment of a community, and finally, evaluating the impact of the program once it has been implemented across a community.

In response to research and consistent with the CBSM philosophy, IES designed a community outreach and education campaign that, in addition to informing citizens, focused on inspiring and facilitating behavioral change. IES employed multiple outlets to reach Golden citizens including community workshops, educational displays, the creation and distributions of informational materials, and education and reminders through various local media outlets. Golden Informer articles identified products containing ECs and offering alternatives. Workshops showed how convenient and cheap it is to make one's own product at home. These diverse strategies helped reached a variety of people within the Golden community.

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Workshops

EC workshops were held at the Golden Community Center, the Front Porch, a senior citizens' area at the Community Center, and Golden City Hall for city employees. All workshop locations are established community hubs. Outreach efforts were done through local and community-sustained channels, such as the Chamber of Commerce, city publications, Golden community center publications and e-newsletters of Golden residents. The workshops included hands-on activities that participants could replicate at home and teach others. IES asked all participants to share their thoughts after each workshop on survey sheets. The responses to these workshop surveys helped when discerning which outreach and advertisement methods were effective in recruiting workshop participants.

Workshop topics included:
1. Contaminant-free housecleaning and grocery shopping
2. Clean up your beauty and skin care routine
3. Parents of preschoolers: child-safe green living / cleaning

Displays

IES created EC-themed displays at the Golden Library, the American Mountaineering Center, Clear Creek Books, and the Golden Visitor's Center. Displays had multiple components, including small and large posters, readable information, product examples, and take-home materials. IES used both tabletops and window space to display posters. Product examples included both EC-free and EC containing products. The products were clearly labeled to show ECs in the listed ingredients of everyday consumer products. Alternative products were featured in order to motivate changes in purchasing and use or consumption. Take-home materials developed by IES are described below in the "Educational Materials" section.

Educational materials

IES created magnets, wallet cards, and handouts including a Buyer's Guide as convenient ways to inform citizens and to promote behavior change. Magnets and wallet cards served as prompts or reminders when making purchase or usage decisions. According to Fostering Sustainable Behavior, "prompts" are reminders to carry out an activity that we might otherwise forget, not to change attitudes or increase motivation but simply to remind us to engage in an action that we are already predisposed to do (p. 26). The EC magnets were the same size as a business or wallet card, intended for the refrigerator. The size and convenience of a wallet card make it an excellent prompt, and for this project highlighted ECs to avoid and alternative products available.

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In addition to the magnet and wallet card prompts, IES distributed educational handouts to inform citizens and to establish norms. These documents are examples of methods to establish community norms that foster sustainable behavior because Fostering Sustainable Behavior states "programs to promote sustainable behavior should attempt to communicate what are accepted behaviors."

Specific educational handouts included the following.

- IES researched, compiled, and distributed a Buyers' Guide to contaminant-free shopping. The Guide provides a glossary of ECs to avoid and suggestions for locally available alternative products. The Buyers' Guide also removes a barrier to engaging in sustainable behavior by helping people find contaminant-free products.
- "Top Ten Ways to Reduce Exposure to ECs," a one-page handout with simple tips on how to change one's behavior to have a smaller EC footprint.
- A resource list of books, articles and visual media available locally to learn more about the issues of trace contaminant pollution, prepared in collaboration with librarians at the Golden (Jefferson County) Library. The library made sure that all the resources listed were available at the Golden Library.
- An essential oils guide, describing alternatives to "fragranced" products and cosmetics. This document and others supplied recipes for those looking to make individual choices about personal care or cleaning products at home.

Media

The community outreach for the project included:

a. Articles published in media outlets
b. Educational materials for distribution
c. Logos and other CEC marketing materials

IES prepared articles for every monthly issue of the Golden Informer, a City publication delivered to every address in Golden. We supplied publication material and news articles to the Golden Transcript and the Denver Post.

We published educational articles in the City of Golden Community Center publication, Re-Create, and the senior citizen newsletter, Front Porch.

We took advantage of local social media, such as the Golden e-newsletter published weekly by Judy Denison, Hillary Mizia's Golden Green Living Examiner blog (www.examiner.com/green-

living-in-denver/hillary-mizia), and electronic newsletters published by Golden city council members.

Accomplishments

- Development of an in-depth education plan
- Development of an in-depth media and communication plan
- Educational displays at the Jefferson County Golden Library (March and May 2010)
- Educational displays at the American Mountaineering Center in Golden (June, July and August 2010)
- Educational displays at Clear Creek Bookstore, downtown Golden (April and June)
- Five community workshops at the Golden Community Center
- Workshop for City of Golden employees
- Created education materials including reading and viewing guide, cleaning guides, workshop agendas and handouts, natural recipe guides, contaminants summary sheet, guidebook, wallet cards, magnets, newsletters, presentations
- Research and development of Buyers Guide, skin lotion guide, personal care and household product recipes
- Publication of educational material in the Golden Informer, the City of Golden's monthly newsletter, which is sent by mail to all Golden residents and available online.
    - "City of Golden Takes the Lead in Preventing Water Pollution," November 2009
    - "Have a Happy and Contaminant-Free Holiday Season," Dec/Jan 2009/2010
    - "Clean House, Clean Water," Feb 2010
    - "Pack Your Pantry With Chemical Free Food and Do Your Part For The Environment," March 2010
    - "Save Money and Reduce Your Chemical Footprint," May 2010
    - "BPA-proof Your Home," June 2010
    - "It's Not Too Late to Make Healthier Choices This Summer: Use Contaminant-Free Water Bottles and Sunscreens," August 2010
- New posts in Your Hub (Denver Post)
- Local citizen-based blogs and e-newsletters on a consistent basis
- Educational materials at the City of Golden website, Golden Transcript / Mile High News
- The Golden Community Center publication Re-create articles
- The Golden Community Center Front Porch newsletter articles
- Fliers were sent out to the more than 600 members of Golden Chamber of Commerce with educational information along with IES workshops announcements (three months)
- Flier to all parents of children at Shelton and Mitchell Elementary Schools in Golden

- Additional online resources were utilized to publicize workshops including the listservs for Colorado Association for Environmental Education, CREEC and Colorado Watershed Association
- Television appearance on CBS Channel 4 "Project Green" on November 7, 2009, promoting EC-free living and the EC Project
- Reached out to alternative and established community groups based on CBSM model
- Collaborative discussions with numerous interested scientists, researchers, nonprofits, and government agencies
    - Presentation to the Greater Golden Downtown Merchants (June 2009 and March 2010)
    - Upper Clear Creek Watershed Association (April 2010)
    - Presentation to the Sustaining Colorado Watersheds Conference, Vail, October 2009
    - Article in the Rocky Mountain Water Quality Analysts Association Newsletter, Winter 2009
    - Presentation to the RMSAWWA/RMWEA Joint Annual Conference, Albuquerque, NM, September 2009
    - Presentation to the 2nd International Conference on Emerging Contaminants (EmCon 2009), Colorado State University, Fort Collins, August 2009
    - Presentation to the Colorado Water Roundtable, AWWA, Denver, July 2009

Post-Pilot Project Plan

In partnership with local elementary schools, IES is designing an after school science program that will educate students on ECs and water systems. IES is developing a program to train community leaders to disseminate the educational programs.

Attachments

- CEC Reading and Viewing List
- Chamber of Commerce fliers
- The Top Ten Ways to Reduce Your Chemical Footprint
- Bisphenol-A (BPA) is an EPA "Chemical of Concern"
- Guide to Contaminant Free Shopping
- Contaminant Free Beauty Products Guide
- Top Ten Ways store poster
- EC Tri Fold Display poster
- Food Safety-Eat Fresh: BPA and BHA poster
- Denver Post Your Hub articles
- Workshop agenda (example)
- Workshop survey (example)

- Personal care product recipes
- Golden Informer articles (see list above)

6. Analysis of surveys and samples

Role

This task was designed to evaluate the effectiveness of the Education and Outreach effort by sampling Golden's wastewater (before treatment) to assess possible changes in EC concentrations and by conducting surveys to measure changes in the awareness of ECs in Golden and in behavior related to ECs. IES conducted water sampling of Golden's wastewater (before treatment) and surveys of Golden's citizens to evaluate possible changes in Golden's behavior as a result of the Education and Outreach Campaign.

For the EC project, data from the survey initiative (Task 4) are most meaningful with those from wastewater sampling (Task 3), with perspectives from before and after the education and outreach campaign (Task 5). Initial wastewater samples were taken to determine chemicals present in the wastewater. These sampling results will serve as a baseline for chemical presence in Golden wastewater, representing the pre-education campaign environment. The initial survey's analysis informs the education and outreach campaign by highlighting chemical awareness that people are and are not well versed on, habits that may be easy to change, habits that may be difficult to change, habits that do not need to be changed, and audiences would be most receptive to target. Effectiveness of the education and outreach campaign is determined by habitual changes reflected in the final survey, and in chemical levels found in final wastewater sample analysis. After designing, testing, and collecting over 300 community surveys and samples, in-depth analysis of the data was required to evaluate the effectiveness of the community education program.

To date, only a subset of samples from the EC Pilot Project have been processed in the EPA Region 8 laboratory. IES has seen preliminary results of the EPA's analysis and eagerly awaits the public release of this data analysis.

On receipt of analytical results promised by EPA, IES will complete the initial and preliminary data analysis comparing samples from before and after the pilot education program. Conclusions will be limited by the unusually long time that the Spring 2009 samples were held by EPA before analysis, pending completion of the new Sample Hold Time 18-month Analytical Study.

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Analysis of the completed Before and After Community Surveys will be completed later this month, to accompany the comparison results of the wastewater samples.

Accomplishments and completions

- Preliminary sample analysis of one week of raw wastewater samples (three times per day), Spring 2009
- Preliminary sample analysis of one day of raw wastewater samples and treated drinking water (four times per day), Spring 2010
- Initial analysis of analytical results, including comparison of methods, to demonstrate validity
- Development and implementation of a Sample Hold Time 18-month Analytical Study

Post-Pilot Project Plan

As provision of the entire complement of data from the EC Pilot Project from the EPA Region 8 Laboratory is still pending, we have yet to completely analyze and interpret the data. Several scenarios are possible, *i.e.*, that (1) statistically significant increases, (2) statistically significant decreases, or (3) no statistically significant differences in ECs are detected in Golden's wastewater following the education campaign. Our working hypothesis is that scenario (1) is unlikely, and our desired outcome is scenario (2), *i.e.*, that decreases in ECs are detectable following the education and outreach campaign. If this is our finding, we will interpret that ECs declined as a result of the education and outreach efforts on the part of IES. Further, if measurable decreases in ECs are detected, IES intends to broaden its target audience to include a wider area and larger communities. Regardless of the results of data analysis, IES plans to use them to inform future outreach methods and to communicate accurate water quality information to stakeholders and interested public citizens. Post-pilot project plans include:

- Statistical analysis of water samples to determine effectiveness of education and outreach campaigns
- Compilation and interpretation of data analysis

Note

The scope of this research effort turned out to be far more vast than originally thought at the time of the project proposal. Delays of up to 18 months at the EPA Laboratory have eaten up and continue to consume limited project resources. As IES is committed to sound and accurate scientific research and communication, the resources required to complete this task were far greater than funded through the Healthy Rivers Fund grant. IES is making up the difference through individual contributions to IES along with generous volunteer efforts.

In addition, the extra work required to manage the delays has caused delays in completion of every other project task.

Attachments

- Preliminary results of Spring 2010 wastewater and drinking water analyses.
- Preliminary results of Spring 2009 wastewater sample analyses.
- LC/MS v GC/MS analytical method comparison illustration
- Preliminary comparison of drinking water and wastewater contaminant concentrations
- Preliminary review of daily CEC fluctuation (caffeine, triclosan), Spring 2009

7. Reporting and evaluation

Role
Share findings with the stakeholder steering committee, publicly release project results.

To provide long-lasting and broad benefits, the results, procedures, decisions, and evaluations of this EC Pilot Project were documented and evaluated. Throughout the project, IES documented its decision-making procedures, progress, and results to ensure complete reporting and evaluation. The Project Steering Committee received comprehensive reports on every task at every Committee meeting. The Steering Committee met, and continues to meet, every two months starting in December 2008. IES has completed the outline and initiated drafts of task reports.

Accomplishments and completions

- Reported project progress, results, and findings every two months since December 2008 to the Stakeholder Steering Committee
- Reported project progress, results, and findings to all stakeholders quarterly via email
- Collected feedback and evaluations of each educational workshop and material submission and creation in anticipation of final report
- Edited and created educational materials and other documents with extensive discussions and while considering feedback from previous surveys, events and outreach.
- Adopting the CBSM model illustrates IES's constant reevaluation of project. The City of Golden and the Rocky Mountain Sustainable Living Association approached us to provide additional workshops, which shows success in following the CBSM model.
- Designed workshops, educational campaign and outreach with the community based social marketing model in mind. By choosing to base the program on this philosophy

more work was required to insure that IES was following the model and adhering to important considerations.
- Approached this issue with the commitment to present scientifically proven solutions.

Post-Pilot Project Plan
- Expanding report pending results of EPA water samples analysis and analysis of before and after surveys.

Attachments
Please see attachments in section 4 and 5.

8. Policy and education; Final report

Role

The objective of this task is to complete the final report on project results, policy recommendations, methodology, future plans for education, and efficacy of the project for future replicability.

The results from surveying Golden residents and analysis of the before and after water samples will be compiled in the final project report, along with evaluation of the results and their implications. Decisions about final recommendations on policy and education have been outlined and are to be included in the final report.

Key Policy Recommendations

<u>Blue Crew Water Stewards</u>
To shift community norms in the direction of more sustainable practices, it will be necessary to establish and maintain an "army" of local "neighborhood leaders" – Blue Crew Water Stewards. In this way, the burden of education and outreach is shared and advanced from within the community. One small under funded (and therefore understaffed) nonprofit organization cannot effectively provide broad-based programs throughout an urban community that will effectively change residents' behavior. See *Future Replicability* below.

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Funding

Grants should fully fund programs, including necessary administration. Small independent nonprofit organizations can provide highly effective services in education, outreach, pollution reduction, pollution prevention and related efforts in support of community and government objectives. In many cases, nonprofits can deliver the relevant services better, faster, and cheaper. But organizations cannot operate effectively with insufficient funding support. Government agencies and corporations and their salaried staff members should recognize that nonprofit personnel are not paid unless funding is provided.

Policy

Pollution reduction and prevention strategies proposed or implemented by government agencies should be subject to independent and objective evaluation for total life cycle costs, proven benefits, and both negative and positive side effects. Proposed strategies that are shown to be ineffective should not be adopted and existing strategies that are not effective should be terminated. Independent nonprofit organizations can provide highly effective services in objective analysis of environmental improvement strategies. In the case of Emerging Contaminants, many current local, state, and federal government agency strategies to inform citizens and reduce pollution are not expected to yield positive results. Resources from existing strategies that are not effective would be better spent on programs that are proven to reduce and prevent pollution.

Accomplishments and completions

- Draft final project report detailed outline
- Compiled recommendations, including critical input from Steering Committee members and stakeholders.
- Drafted final report outline with objective to disseminate to the community as well as other researchers and educators.
- Developed the final report to train community members to conduct workshops. "Personal contact is emphasized because social science research indicates that we are most likely to change our behavior in response to direct appeals from others" (FSB p. 6).

Post-Pilot Project Plan

- Insert final analysis in final report
- Distribute electronic final report to all interested parties

Future replicability

Blue Crew Water Stewards

To advance the objectives of the Emerging Contaminants: Linking Science to Effective Action Project, IES is developing the Blue Crew Water Stewards Project to promote water stewardship

through community outreach and education. Community-based social marketing (CBSM) "draws heavily on research in social psychology which indicates that initiatives to promote behavior change are often most effective when they are carried out at the community level and involve direct contact with people." [Fostering Sustainable Behavior.] This project will use CBSM methodologies to avoid the shortcomings of past environmental outreach efforts and to establish an environmental ethic in community residents that is effective and sustaining. It will also build on previous IES accomplishments.

The project will develop the methods to draw on existing social networks (such as the senior center, parent groups, neighborhoods, homeowners associations, schools and church groups) to develop a taskforce of local leaders to educate sub-communities about contaminants of emerging concern and thus to reduce and prevent water pollution at the household level. The proposed plan will outline how to recruit leaders and how to create the teams or "Crews" that make up the Blue Crew Water Stewards. As part of the proposed pilot project, neighborhood leaders will be selected, trained and recruited to lead these Blue Crews.

To successfully carry out the Blue Crew Water Stewards Project, a pilot program is needed. This pilot, based on a written plan, will ensure the efficacy of a community-wide larger project by establishing methods of community outreach, volunteer organizing and training. Based on previous programs, research and outreach are needed to cultivate relationships with existing social networks and to recruit project leaders. Having dedicated participants and community support is critical for successful completion of the Blue Crew Water Stewards Project. The pilot program, to be developed in the proposed plan, will test and evaluate this issue. The proposed pilot project requires a written plan to efficiently allocate time and resources. Once this written plan is fully researched and compiled, IES will be prepared to begin establishing Blue Crew Water Stewards teams.

Initial steps include background research, community outreach efforts to partner with willing volunteers and team leaders, and a report outlining the future Blue Crew Water Stewards Pilot Project. This research is needed to explore other successful CBSM environmental protection programs and leadership training techniques. Methods to recognize and reward team leaders will also be researched, to enhance active community participation. Community outreach initiatives are crucial to build awareness about this program and to recruit volunteers to undergo future training as Blue Crew Water Stewards team leaders. Once research has been completed and relationships made, a report detailing plans for a pilot program will be completed. This plan will involve multiple steps to ensure the development of a well researched, community supported and executable pilot program.

With seed funding from New Belgium Brewing Company, IES has begun to develop preliminary

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plans for this program.

Attachments
Final Project Report Detailed Outline

Carol E. Lyons
Carol@i4es.org
November 15, 2010

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EMERGING CONTAMINANTS: LINKING SCIENCE TO EFFECTIVE ACTION

Steering Committee Meeting
Wednesday, August 12, 2009, 9:30 – 11:30 a.m.

Council Chambers Room, City Hall
911 10th Street, Golden, Colorado 80401

Proposed AGENDA

1. Surveys
    a. Focus groups and in-depth interviews
    b. Venues, incentives, volunteers

2. Sampling and Analysis
    Update (Mark Murphy and Robert Young)

3. Education and Outreach
    a. CBSM refresher
    b. EC prevention strategies refresher
    c. Brainstorming education/outreach approaches

4. Possible name change: Contaminants of Emerging Concern

5. Funding

6. Next Steps

Sara Klingenstein, Project Coordinator, Sara@i4es.org

Reminder: EC Project Steering Committee meetings are 9:30 a.m. to 11:30 a.m., at the Council Chambers room in City Hall in Golden, on the second Wednesday every other month:

- October 14
- December 9

CONTAMINANTS of
EMERGING CONCERN

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CONTAMINANTS OF EMERGING CONCERN: LINKING SCIENCE TO EFFECTIVE ACTION

Steering Committee Meeting
Wednesday, October 14, 2009, 9:30 – 11:30 a.m.

Council Chambers Room, City Hall
911 10th Street, Golden, Colorado 80401

Proposed AGENDA

1. Survey update

2. Water sampling and analysis update

3. Education and outreach
    a. Partnerships
        i. Golden Community Center
        ii. Golden Public Library
        iii. Golden Transcript
        iv. Golden Informer
            - Holiday theme ideas for Dec./Jan. issue
        v. Other Golden communities
    b. Training volunteers
        - Tupperware parties without the Tupperware
    c. School-age curriculum
    d. Other ways to reach the community

4. Funding
    a. Brainstorming ways to reach agencies and corporations for year-end giving opportunities
    b. 2010 and beyond: Brainstorming ways to be a part of ongoing agency and corporate giving

5. Next Steps
   2010 meeting schedule

Sara Klingenstein, Project Coordinator, Sara@i4es.org

Reminder: EC Project Steering Committee meetings are 9:30 a.m. to 11:30 a.m., at the Council Chambers room in City Hall in Golden, on the second Wednesday every other month.
Next meeting: Wednesday, December 9, 2009, 9:30 – 11:30 a.m.

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CONTAMINANTS OF EMERGING CONCERN: LINKING SCIENCE TO EFFECTIVE ACTION

Steering Committee Meeting
Wednesday, December 9, 2009, 9:30 – 11:30 a.m.

Fire Training Room at the Golden Fire Department. Same building as City Hall, 911 10th Street, Golden. Enter in the front of the Fire Department, just east of the main entrance to Golden City Hall. Enter the front doors, head upstairs; receptionist will show you to the training room.

Proposed AGENDA

1. Project updates

2. Education and outreach
    a. Getting our message across
        i. Jefferson County – Golden Library display
        ii. Golden Community Center workshops
        iii. Golden Informer: series of four articles
    b. Elementary school-age curriculum
    c. Other ways to reach the community

3. Funding
    a. Specific project needs
    b. Sponsorship

4. Next Steps
    2010 meeting schedule

Sara Klingenstein, Project Coordinator, Sara@i4es.org

Reminder: EC Project Steering Committee meetings are 9:30 a.m. to 11:30 a.m., at the Council Chambers room in City Hall in Golden, on the second Wednesday every other month.

2010 Meetings: All are Wednesday, 9:30 – 11:30 a.m.

February 10, 2010	April 14	June 9
August 11	October 13	December 8

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CONTAMINANTS OF EMERGING CONCERN: LINKING SCIENCE TO EFFECTIVE ACTION

Steering Committee Meeting
Wednesday, February 10, 2010, 9:30 – 11:30 a.m.

Council Chambers Room, City Hall
911 10th Street, Golden, Colorado 80401

Proposed AGENDA

1. Project updates
    a. New interns
    b. Analytical update

2. CEC Guidebook
    a. Status
    b. CEC definition
    c. Next steps

3. Front Porch workshop, Golden Community Center, February 11, 11:30 – 12:30

4. Funding
    a. Specific project needs
    b. Sponsorship

5. Next Steps

Sara Klingenstein, Project Coordinator, Sara@i4es.org

Reminder: EC Project Steering Committee meetings are 9:30 a.m. to 11:30 a.m., at the Council Chambers room in City Hall in Golden, on the second Wednesday every other month.

Next meeting: Wednesday, April 14, 2010, 9:30 – 11:30 a.m.

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CONTAMINANTS OF EMERGING CONCERN: LINKING SCIENCE TO EFFECTIVE ACTION

Steering Committee Meeting
Wednesday, April 28, 2010, 9:30 – 11:30 a.m.

Council Chambers Room, City Hall
911 10th Street, Golden, Colorado 80401

Proposed AGENDA

1. Project updates
   - Workshops
   - Displays
   - Outreach
   - Presentations

2. CEC Guidebook
   - Content preliminary review

3. Outreach and education
   - Review
   - Advice
     - Workshops, displays, seminars, articles
     - Fraternal and similar organizations in Golden
     - Medical / health offices, organizations
     - YMCA, youth organizations

4. Funding
   - 1% for the Planet
   - CDPHE contacts for SEP funds
   - Other sources

5. Next Steps

Reminder: EC Project Steering Committee meetings are 9:30 a.m. to 11:30 a.m., at the Council Chambers room in City Hall in Golden, on the second Wednesday every other month.

Next meeting: **Wednesday, June 9, 2010, 9:30 – 11:30 a.m.**

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CONTAMINANTS OF EMERGING CONCERN: LINKING SCIENCE TO EFFECTIVE ACTION

Steering Committee Meeting
Wednesday, June 9, 2010, 9:30 – 11:30 a.m.

Council Chambers Room, City Hall
911 10th Street, Golden, Colorado 80401

Proposed AGENDA

CEC Community Survey
- 2009 analysis
- 2010 preparation (volunteers?)

Education and Outreach
- Workshops
- Educational materials
- Displays
- Media and community

CEC Project Wastewater Sampling and Analysis
- Update

CEC Project Plan
- Update and review

Funding
- Why should you care? Give money?

Next Steps

Reminder: EC Project Steering Committee meetings are 9:30 a.m. to 11:30 a.m., at the Council Chambers room in City Hall in Golden, on the second Wednesday every other month.

Next meeting: **Wednesday, August 11, 2010, 9:30 – 11:30 a.m.**

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CONTAMINANTS OF EMERGING CONCERN: LINKING SCIENCE TO EFFECTIVE ACTION

Steering Committee Meeting

Wednesday, August 11, 2010, 9:30 – 11:30 a.m.
Council Chambers Room, City Hall
911 10th Street, Golden, Colorado 80401

Proposed AGENDA

ChemicalFootprint.org
- Preliminary survey
- Plan and content

Elementary-age Workshop

CEC Project Wastewater Sampling and Analysis
- Data quality objectives; relate concentrations to source; project objectives
- Sample hold time impact

CEC Community Survey
- 2010 preparation (volunteers?)

Education and Outreach
- Update on workshops, educational materials, displays
- Ongoing efforts

CEC 2010-2011 Project Plan
- Update and review

Funding
- What can we do for you?

Next Steps

Reminder: EC Project Steering Committee meetings are 9:30 a.m. to 11:30 a.m., at the Council Chambers room in City Hall in Golden, on the second Wednesday every other month.

Next meeting: **Wednesday, October 13, 2010, 9:30 – 11:30 a.m.**

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CONTAMINANTS OF EMERGING CONCERN: LINKING SCIENCE TO EFFECTIVE ACTION

Steering Committee Meeting

Wednesday, October 13, 2010, 9:30 – 11:30 a.m.
Council Chambers Room, City Hall
911 10th Street, Golden, Colorado 80401

AGENDA

Blue Crew Water Stewards Project
- Planning grant from New Belgium Brewing

Funding
- Colorado Gives Day, December 8
- IES Annual Campaign
- IES on Facebook
- Contaminants of Emerging Concern wallet cards
- What can we do for you?

CEC Community Survey – update

Elementary-age Workshop – update

CEC 2010-2011 Project Plan

ChemicalFootprint.org

CEC Project Wastewater Sampling and Analysis

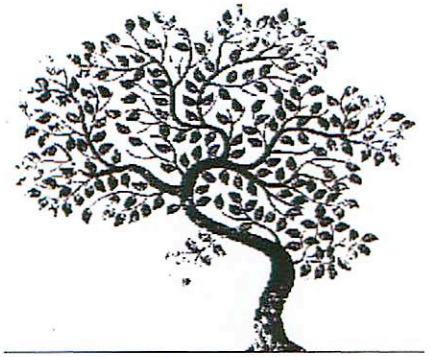
Next Steps

Reminder: CEC Project Steering Committee meetings are 9:30 a.m. to 11:30 a.m., at the Council Chambers room in City Hall in Golden, on the second Wednesday every other month.

Next meeting: **Wednesday, December 15, 2010, 9:30 – 11:30 a.m.** ***[Third Wednesday]***

AGENDA

Introduction	Carol Lyons
Fate Of Steroid Sex Hormones In The Environment	Thomas Borch
EPA's Challenges in Addressing Contaminants of Emerging Concern	Kristen Keteles
Emerging Contaminants: Linking Science to Effective Action	Sara Klingenstein
Discussion	
Reception	
Adjourn	4 p.m.



Emerging Contaminants Threats to Colorado's Water Supply

April 30, 2009

Colorado Environmental Partnership

INSTITUTE FOR
ENVIRONMENTAL SOLUTIONS

Carol Lyons
Executive Director
Carol@i4es.org

Emerging Contaminants:
Linking Science to Effective Action

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EmCon 2009: 2nd International Conference
on Occurrence, Fate, Effects, and Analysis of
Emerging Contaminants in the Environment

August 7, 2009

Carol E. Lyons, Sara A. Klingenstein, Sarah B. Lade, Kristin Brubaker, Institute for Environmental Solutions
Thomas Borch, Robert B. Young, Department of Soil and Crop Sciences, Colorado State University

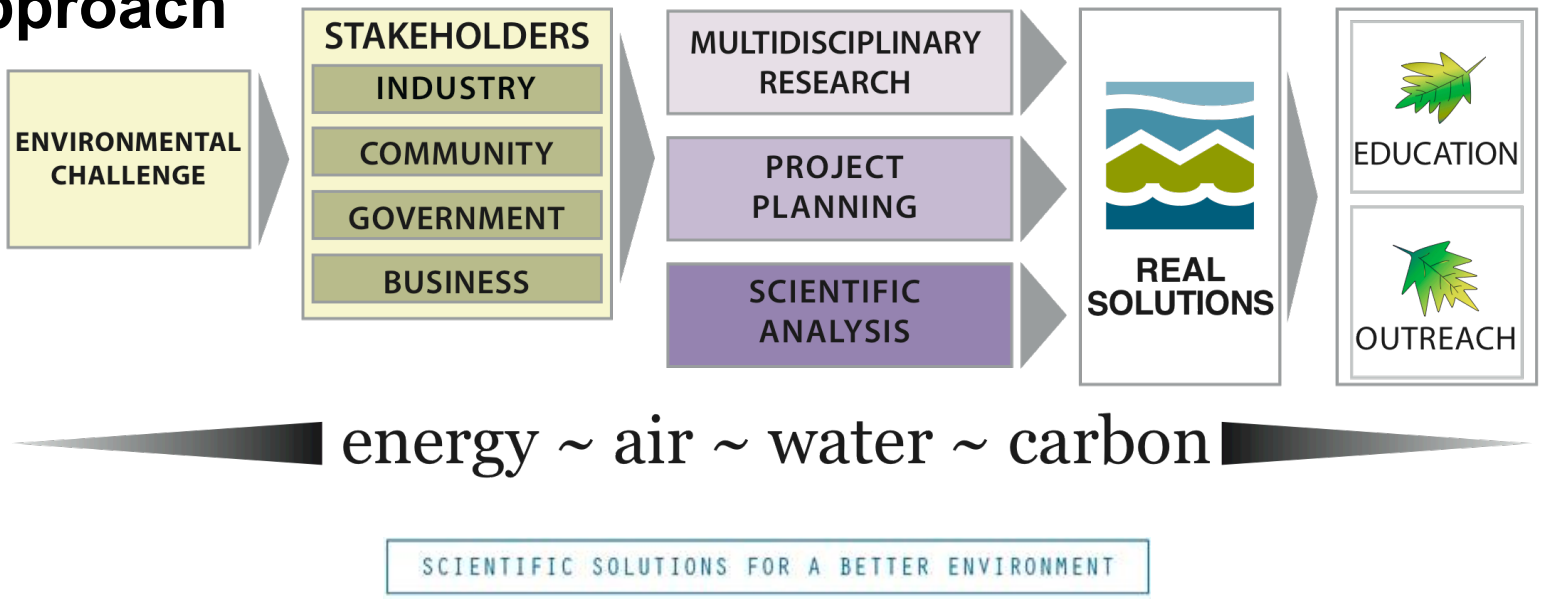
SCIENTIFIC SOLUTIONS FOR A BETTER ENVIRONMENT

INSTITUTE FOR ENVIRONMENTAL SOLUTIONS

Mission

Engage stakeholders to deliver proactive, technically sound solutions to complex environmental and natural resource problems that avoid unwanted side effects.

Approach



SCIENTIFIC SOLUTIONS FOR A BETTER ENVIRONMENT

Solutions to the EC Problem

1) Traditional: End of pipe treatment
   - Reactive
   - Difficult, expensive, variable effectiveness
2) Regulation: Control
   - Reactive
   - Expensive, ineffective, time consuming
3) **Source reduction: Prevention**
   - **Proactive**
   - **Cheap, safe, quick**

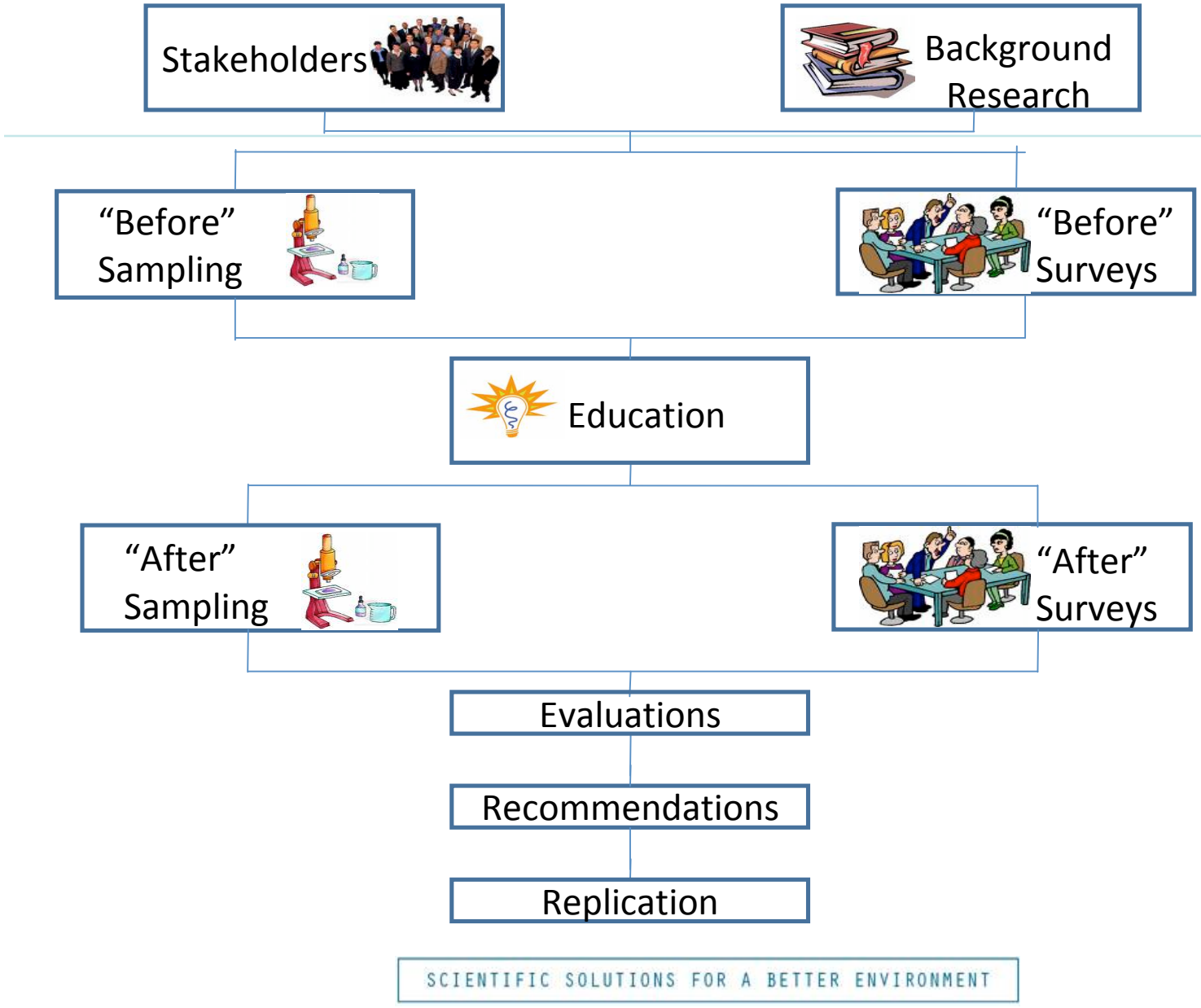
EC Source Reduction

- EC Source: Consumer activity
- Reduction approach: education
- Cultivates informed consumer base
  - Advances regulation through public demand
  - Promotes R&D through citizen and consumer values, and reduces need for new technology

The EC Project: EC Source Reduction

- Pilot project in the City of Golden, Colorado
- Reduce ECs through public education
- Identify easy but consequential recommendations
- Two evaluative measures

The EC Project



The EC Project: Education and Outreach

- Information alone often has little effect on behavior
  - Households that received and read an in-depth handbook on water efficiency made no changes to water consumption
- Economic self-interest fails to motivate
  - California utilities spend $200 million annually on media advertising how energy conservation saves money; little effect on energy use

The EC Project:
Community-Based Social Marketing

- A proven framework for designing active, targeted education and outreach campaigns to foster sustainable behavior
- Carried out at community level
  - Direct involvement
- CBSM provides a set of tools

McKenzie-Mohr, Doug, and William Smith. **Fostering Sustainable Behavior**. Gabriola Island, BC: New Society, 1999.

www.cbsm.com

The EC Project:
Designing effective education and outreach

- Make no assumptions
  - Focus groups and surveys
- Literature review

The EC Project:
Tools for fostering sustainable behavior

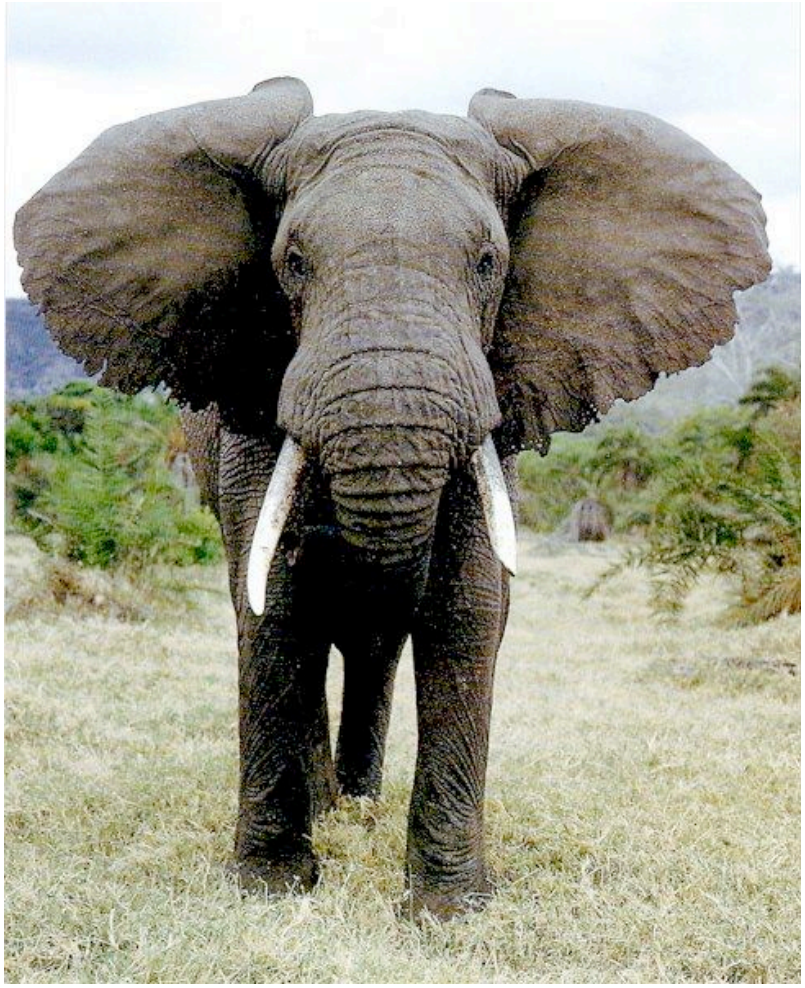
Gathering commitment – from intention to action, recruiting *intention* from people.

–Proven in the past: Making a commitment increases likelihood of change

–For EC Project: Ask people to sign a pledge to reduce use of certain products

The EC Project:

Tools for fostering sustainable behavior, ctd.



Prompts – remembering to act sustainably, a reminder present with people when making relevant decisions.

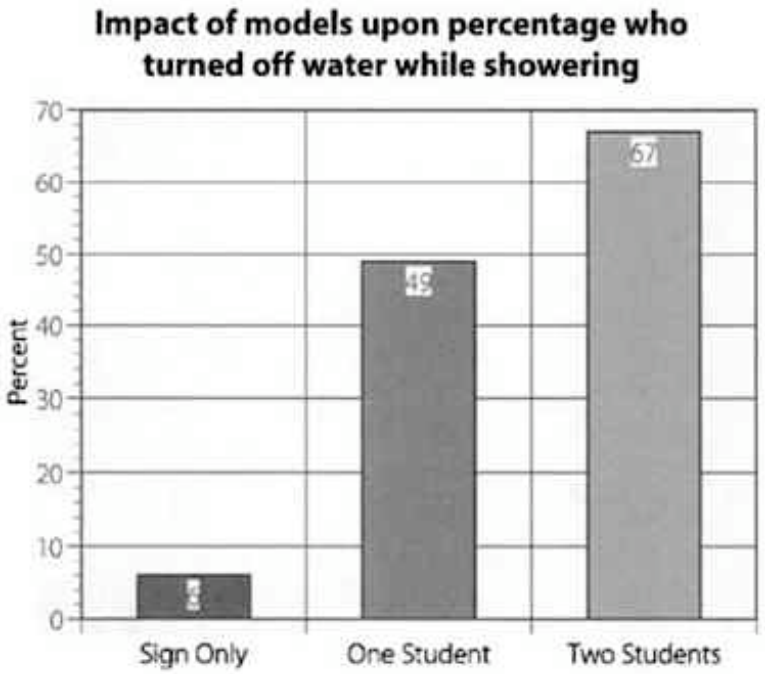
- Proven in the past:
  - Recycling reminders over bins
  - Littering reduction
- For EC Project: grocery pads with pre-printed info, wallet cards.

The EC Project:

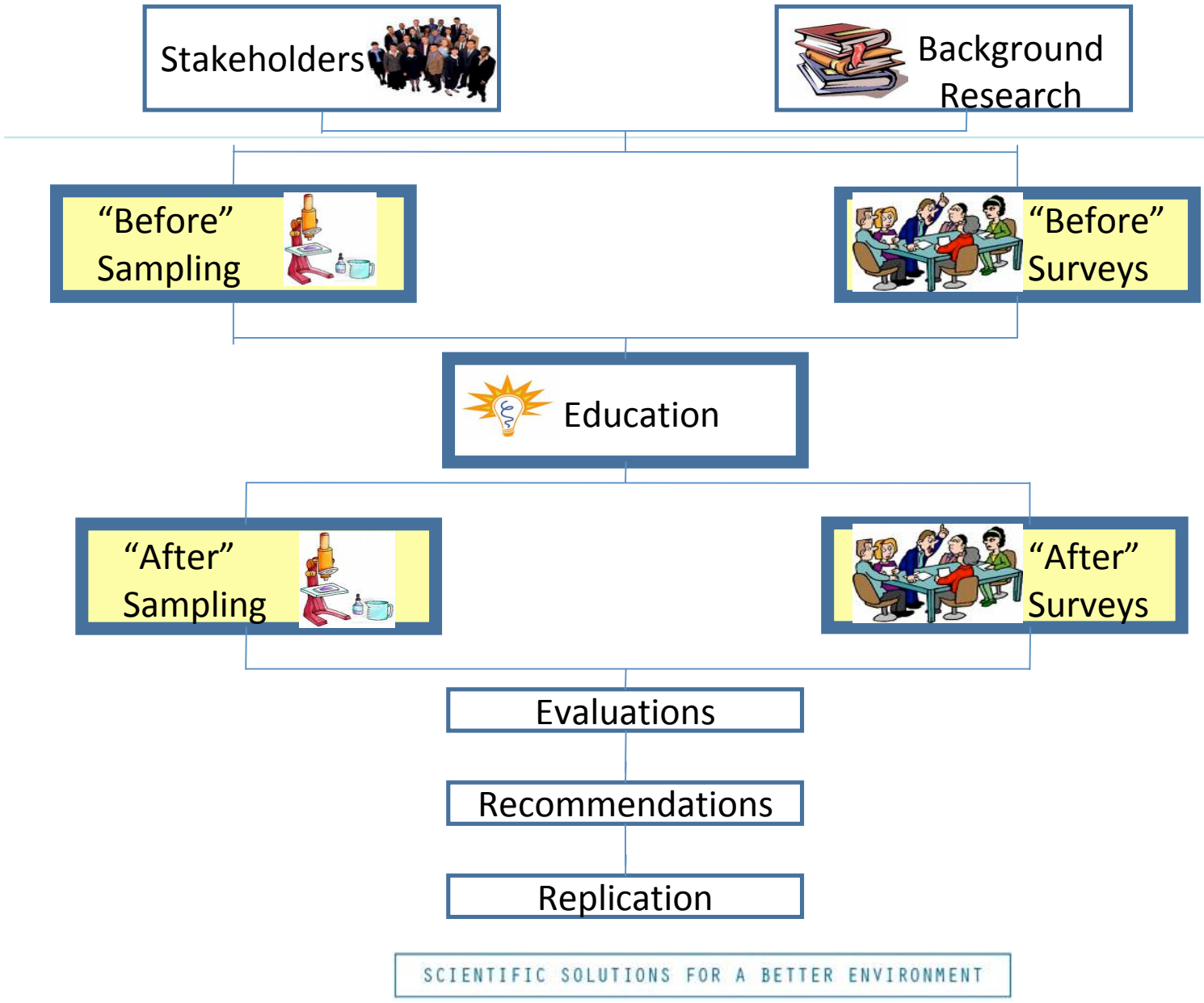
Tools for fostering sustainable behavior, ctd.

Norms – building community support

- Proven in the past:
  - Water conservation in showers
- For EC Project:
  - Challenge groups with mothers
  - School curriculum



The EC Project: Evaluative Measures



The EC Project:
Evaluation measures

Chemical Analysis of Wastewater Samples

Robert Young and Thomas Borch, Colorado State University:
Liquid chromatography-tandem mass spectrometry (LC-MS/MS) using electrospray ionization

Mark A. Murphy, U.S. EPA Region 8 Lab, Golden, CO:
Direct inject method for PPCPs in water

Partial List of Compounds
Atrazine
Benzophenone
Butylated hydroxyanisole (BHA)
BPA (bisphenol A)
Caffeine
Musk ketone
Nonylphenol
Octylphenol
Triclocarban
Triclosan

The EC Project:
Evaluation measures, ctd.

Community surveys

- 300 - 500 surveys, before and after education campaign
- Determine changes in awareness and reported behavior
- “After” survey asks whether respondent was affected by campaign

The EC Project:
Project Analysis

- First phase of pilot project
  - Limited funds
  - Limited time
- Non-quantifiable results
  - Community educates us on how to be better community educators in the future

Future Plans/Recommendations

- ChemicalFootprint.org
- Pharmaceutical compounds: used vs. unused
- Unused pharmaceutical disposal – scientific/economic analysis of alternatives
- Collaboration
- Comments and suggestions

Conclusions

- Important to compare virtues of chemical compounds with their eventual environmental and health costs
- Important to have realistic approach on how to use limited resources to produce greatest environmental benefits
- Cheaper and easier to keep ECs from ever entering waterways than to treat later, and problem is still young

www.i4es.org/emerging.html

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Thomas Borch, Robert B. Young, Department of Soil and Crop Sciences, Colorado State University

Memorandum
For Internal Discussion Only
Please do not copy or quote.

To: Institute for Environmental Solutions
From: Robert B. Young, Ph.D. Student
Thomas Borch Research Group, Colorado State University
Date: September 11, 2009
Re: Summary – Screening Sample Analysis of Untreated Wastewater from Golden, CO

The purpose of this memorandum is to summarize the results of a screening sample analysis of untreated wastewater from the City of Golden, Colorado ("Golden"), performed on behalf of the Institute for Environmental Solutions ("IES"). The screening sample was analyzed at the Southern Nevada Water Authority's Water Quality Research and Development laboratories in Henderson, Nevada, using a previously developed analytical method for the detection of 26 pharmaceuticals and endocrine disrupting chemicals (the "SNWA method"). At my request, data from the screening sample was not subjected to internal review by the Southern Nevada Water Authority ("SNWA"), in order to expedite the analysis and the data's release.

The purpose of the screening sample was to determine which compounds are present in Golden's untreated wastewater, and the magnitude of their presence. Initially, the information about presence was to be used to identify potential target compounds for IES' study on the use of education and community-based marketing to reduce household and personal care contaminants in wastewater. The information about magnitude would be used to develop the method for analyzing Golden's wastewater samples during the IES study (the "IES method"). As an example, the IES method is expected to use isotopically labeled internal standards to improve the accuracy of concentrations determined under the IES method. To use this technique effectively, internal standards must be added to Golden's wastewater samples at concentrations similar to the target compounds' expected concentrations. The actual target compound concentrations are then determined by reference to the internal standard concentrations. Qualitative information about the concentrations of compounds detected in the screening sample (i.e., their magnitude) can be used to estimate appropriate internal standard concentrations for the IES method.

The SNWA method, like the IES method, uses isotopically labeled internal standards. To account for a range of possible target compound concentrations, the screening sample of Golden's untreated wastewater was split into 25 mL and 475 mL volumes. Each amount was spiked with internal standards, extracted by solid phase extraction, and concentrated to 0.5 mL (i.e., the 25 mL volume was concentrated 50x, and the 475 mL volume was concentrated 950x). The SNWA method includes additional quality control measures, such as duplicate samples, laboratory and field blanks, and laboratory-grade water spiked with known concentrations of the target compounds (a "laboratory control sample"). All samples were analyzed by liquid chromatography- tandem mass spectrometry (LC-MS/MS) in selected reaction monitoring (SRM) mode. Because some target compounds respond better to positive ionization, and others respond better to negative ionization, each sample was analyzed twice, permitting the use of both positive and negative electrospray ionization.

The SNWA method uses internal standard concentrations that are correlated to samples routinely analyzed by SNWA. Despite the use of various quality control measures, if these internal standard concentrations are poorly correlated with target compound concentrations in the screening sample, there is a substantial risk of inaccurate data. For this reason, data from the screening sample should be considered ***qualitative***, and reliable only with respect to the magnitude of a target compound's presence. Data from the screening sample is intended to be used ***for internal purposes only***, and should not be disclosed for any other purpose, orally or in writing, without prior authorization and appropriate qualifications regarding the data's accuracy.

Subject to the qualifications described herein, data from the screening sample is set forth in Appendix A (attached). No information is provided for pharmaceutical compounds detected in the screening sample, because the IES study will not target pharmaceutical compounds. All target compound concentrations in laboratory and field blanks were below reporting limits, suggesting that cross-contamination did not occur. After taking expected recoveries into account, analysis of the laboratory control sample generated acceptable target compound concentrations, except that the calculated concentration of benzophenone was significantly lower than expected. Benzophenone was not reanalyzed, at my suggestion, because of the qualitative nature of the screening sample analysis, and because acceptable benzophenone concentrations were detected when known concentrations of benzophenone were spiked into Golden's untreated wastewater ("matrix spike samples").

The data in Appendix A suggests that household and personal care products generally can be found in Golden's wastewater at concentrations ranging from hundreds (100's) to thousands (1000's) of ng/L, and that internal standards should be spiked accordingly. The data in Appendix A also suggests that the analysis of some target compounds may be affected by interferences, notwithstanding the use of LC-MS/MS, SRM, and isotopically labeled internal standards. The use of matrix spike samples might help to mitigate the effects of these interferences by increasing target compound amounts relative to interferences in the wastewater samples. However, continued development of the IES method, and determination of internal standard concentrations appropriate for the IES method, will depend on the identity of compounds targeted by the IES method, and their expected concentrations in Golden's wastewater. Method development is expected to continue throughout the IES study.

Please contact Robert Young at 970-222-2304 or robertyoung3@gmail.com if you have any questions about the screening sample or the SNWA method.

Appendix A. Qualitative Data from Screening Sample Analysis of Untreated Wastewater from the City of Golden, Colorado.

Target Compound	Magnitude of Calculated Concentration (ng/L)	Comments
Bisphenol A	600	Substantial interferences present; internal standard severely suppressed in 475 mL samples, and too low for accurate quantitation in 25 mL sample (peak area was smaller than that of lowest calibration point)
BHA	150	
Triclosan	Above detection limit, but could not be quantified	Instrument response over the method's calibration range was nonlinear, and apparent concentration of triclosan was too high to quantify with the resulting calibration curve; triclosan will require special attention during method development
Octylphenol	50	No internal standard was used for quantification; octylphenol in matrix spike sample was significantly lower than expected, suggesting suppression and the possibility that the calculated concentration is understated
Musk ketone	< 50	Substantial interferences present; internal standard severely suppressed in 475 mL samples; target compound difficult to distinguish from interferences in all wastewater samples; musk ketone is probably not present at significant levels
Atrazine	Below detection limits (< 0)	
Benzophenone	800	Matrix spike values were acceptable, despite low value in laboratory control sample
TCPP	600	
TCEP	250	
DEET	300	

Carol,
Here is a general overview of the EPA Region 8 Lab method for PPCPs.

We are in the process of setting up a direct inject method for PPCPs in water. Instrumentation we are using is an API5000 triple quadrupole LC/MS/MS with a Waters Acquity UPLC. We are injecting 50uL of sample. Our expected calibration range is from 10ppt to 1000ppt. We are trying to come up with a method to analyze for low ppt levels of PPCPs in water with no sample preparation except sample filtering. We will start analyzing samples at the end of August. I would expect that it will take 2-3 months of consistent analyses to really begin to fine tune the method and work out any bugs and limitations. We are using labeled isotopes internal standards to compensate for sample matrix issues. We have a list of 4 ESI+ labeled internal standards and 4 ESI- labeled internal standards which we are in the process of optimizing the method by attaching the appropriate internal standards to the appropriate compounds. This is what will take a few months to fine tune. The initial internal standards that are attached to specific compounds will undoubtedly change after a few months. Come this winter we look at expanding our list of target compounds to include a wider variety of compounds and classes of compounds. We have had excellent results with our direct inject analysis method of pesticides in water using the same instrumentation with reporting limits of 10ppt for most compounds and we expect similar results for the PPCPs.

Mark Murphy
July 29, 2009

A Guidebook to Contaminants of Emerging Concern

CONTAMINANTS OF
EMERGING CONCERN

of the

INSTITUTE FOR
ENVIRONMENTAL SOLUTIONS

October 2010

DRAFT FOR REVIEW – Do not copy or cite.

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Susan K. Sherrod, Editor
Susan@i4es.org

We would like to thank Sara Klingenstein, Lys Smith, Peter Rice, Sarah Boyd Lade, Annette Shinn, Susan K. Sherrod, Ph.D., Carol E. Lyons, Eryn Murphy, and the IES-CEC Steering Committee for their contributions to this volume.

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I. INTRODUCTION

Welcome to the Institute for Environmental Solution's guidebook on Contaminants of Emerging Concern (CECs). This guidebook offers an overview of CECs and many of the issues surrounding them. IES defines CECs as chemicals whose occurrence in the environment is detectable in trace amounts, but whose patterns of occurrence (temporal and spatial), fate, and consequences are poorly understood and may be, or are suspected of being, detrimental to humans and/or ecological health.

The U.S. EPA offers a more elaborate definition of CECs, defined by the agency as "chemicals and other substances that have no regulatory standard, have been recently 'discovered' in natural streams (often because of improved analytical chemistry detection levels), and potentially cause deleterious effects in aquatic life at environmentally relevant concentrations. They are pollutants not currently included in routine monitoring programs and may be candidates for future regulation depending on their (eco)toxicity, potential health effects, public perception, and frequency of occurrence in environmental media. CECs are not necessarily new chemicals. They include pollutants that have often been present in the environment, but whose presence and significance are only now being evaluated."[1] We concur wholly with this definition and recommend it for consideration while using the IES working definition in the first paragraph.

CECs represent a type of pollution that has only recently been recognized as an issue.[2] CECs deserve consideration as a new kind of pollution for several reasons, two of which we highlight here: first, there is no single *point source* (like a pipe leading from a factory and discharging to a stream) for many CECs; and second, many CECs are chemicals that are deliberately manufactured and added to goods by consumer demand, rather than being unavoidable byproducts of industrial processes. Many CECs are chemicals that appear in everyday products like shampoo, providing desirable qualities such as fragrance. Similar use of similar products among hundreds or thousands of households creates a CEC waste stream that represents a potential pollution problem for downstream ecosystems, including human users.

The Institute for Environmental Solutions (IES) has initiated a pilot project in Golden, CO, for 2009-2010 focusing on Contaminants of Emerging Concern. The objective of the CEC pilot project is to reduce the concentrations of CECs in Golden's wastewaters via community education. By making the citizens of Golden more aware of the ingredients in the products that they purchase and use at home, IES hopes that residents will diminish their use of CECs, thus improving the quality of Golden's wastewater and the downstream water supply of other Colorado residents.

By their nature CECs are exclusively human in origin, from manufacture to use to environmental release. Sources of CECs include pharmaceutical, personal care, household, and agricultural or lawn care products.[*] Some CECs fall into multiple categories due to multiple applications:

- **Personal Care Products (PCPs)** include cosmetics, sunscreens, soaps, lotions, perfumes, and hair care products. PCPs contain various plasticizers, synthetic fragrances, nanoparticles,

[*] We will not consider industrial sources of CECs in this publication because they tend to be point sources and as such are subject to different forms of regulation and monitoring.

preservatives, antimicrobials, and other ingredients that may be classified as CECs. Synthetic fragrances and triclosan have received distinct attention as CECs.

- **Household Products** such as cleaners, packaging, plastics, and even children's clothing and toys may contain CECs. Surfactants, plasticizers, flame retardants, and other useful chemicals may have detrimental effects once released into the environment.
- **Agricultural operations** include farms (organic or conventional), livestock operations (including free-range), and confined animal feeding operations. Residential **lawn care** can also be considered part of this category due to the use of similar chemicals in ways similar to larger-scale agriculture. Agricultural operations can release pharmaceuticals (see below), pesticides (anything that kills biota including insecticides, fungicides, and herbicides), steroid hormones, and other CECs directly into the water supply via runoff. Due to the scale and nature of conventional agricultural operations, large quantities of pesticides are directly released to the environment in their field applications.
- Once released to the environment, the fates, effects, and geographic patterns of most **pharmaceuticals** in surface waters are largely unknown.[3] Some sources estimate that there are 3000 different active pharmaceutical ingredients on the market today, but only a small number of those – approximately 150 – have been evaluated in environmental studies.[4] Pharmaceutical ingredients are often not fully assimilated, but can be excreted in active form to water supplies[5] with potentially unintended consequences for aquatic life.[3] Pharmaceutical metabolites (the biochemical products resulting from a body's metabolism) may also be biologically active. Moreover, the combination of multiple pharmaceutical compounds in a body of water may form a "cocktail" with consequences that are unpredictable both in effect and magnitude.[6] This "cocktail" effect may be true not only of pharmaceutical products but of all CECs.

The focus of the 2009-2010 CEC pilot project in Golden is on personal care and household products. Although pharmaceutical compounds and lawn care products indisputably meet the definition of Contaminants of Emerging Concern (above), IES has determined that they do not fall within the scope of the CEC pilot project. Pharmaceuticals will not be targeted by IES efforts for reduced consumption or alternative products because consumer use of prescription drugs is not elective in the same way that use of certain household and personal care products is elective. Similarly, lawn and garden products will not be subject to initial IES efforts because the pilot project is intended to effect and measure CEC reductions specifically in wastewater. Lawn and garden products typically enter the environment via runoff so they would not necessarily be detected in municipal wastewater (unless poured down a household drain). Given the limitation of resources, current IES efforts will focus on CECs with more direct, and hopefully measurable, effects on wastewater; future efforts may be expanded to include more CECs.

The following chapters discuss substantive concepts pertaining to Chemicals of Emerging Concern, including the avenues by which they are released to the environment (sources) and their fate once they are uncontained in the environment (Chapter II), their effects on humans and ecosystems (Chapter III), conventional wastewater treatment processes (Chapter IV), and efforts to prevent their occurrence and mitigate their effects, including regulatory action (Chapters V and VI). Appendix 1 investigates eleven specific CECs and their sources, environmental fate, and effects.

II. SOURCES AND ENVIRONMENTAL FATE OF CECS

Sources of CECs

The sources of contaminants of emerging concern are myriad and include household products, personal care products, and food (which also serves as an avenue of CECs from agricultural applications to the environment) and its packaging. Because these sources are integral to our lifestyles, any household can be the entry point of CECs to ecosystems via wastewater channels. The chemical transport of CECs from a home into the wastewater stream can be direct via wastewater disposal, or indirect via landfills, septic systems, or incineration (Figure 1). For this discussion we will focus on wastewater disposal from household flushing or rinse water drainage from sinks and showers.

Some of the CECs in personal care products, which typically enter a wastewater stream via shower or sink drain and automatic washers, are:

- Ultraviolet (UV) blockers to preserve colors and scents, particularly those packaged in clear glass, such as benzophenone.[7]
- Antimicrobial preservatives, *e.g.*, butylated hydroxyanisole (BHA), that inhibit the growth of fungi and bacteria such as in the acne medication Accutane.[8]
- Artificial fragrances such as musk ketone. Forty-one percent of candles, air fresheners, and aromatherapy products use musks as an artificial fragrance. This value is nearly thirty-five percent for soaps, shampoos, and detergents, and twenty-five percent for perfumes and cosmetics.[9]
- Surfactants such as nonylphenol and octylphenol that reduce surface tension for anything that lathers, *e.g.*, shampoo and soaps.
- The antimicrobial agents Triclosan in hand soaps, deodorants, cosmetics, lotions, creams, toothpastes, and mouthwashes.[8]

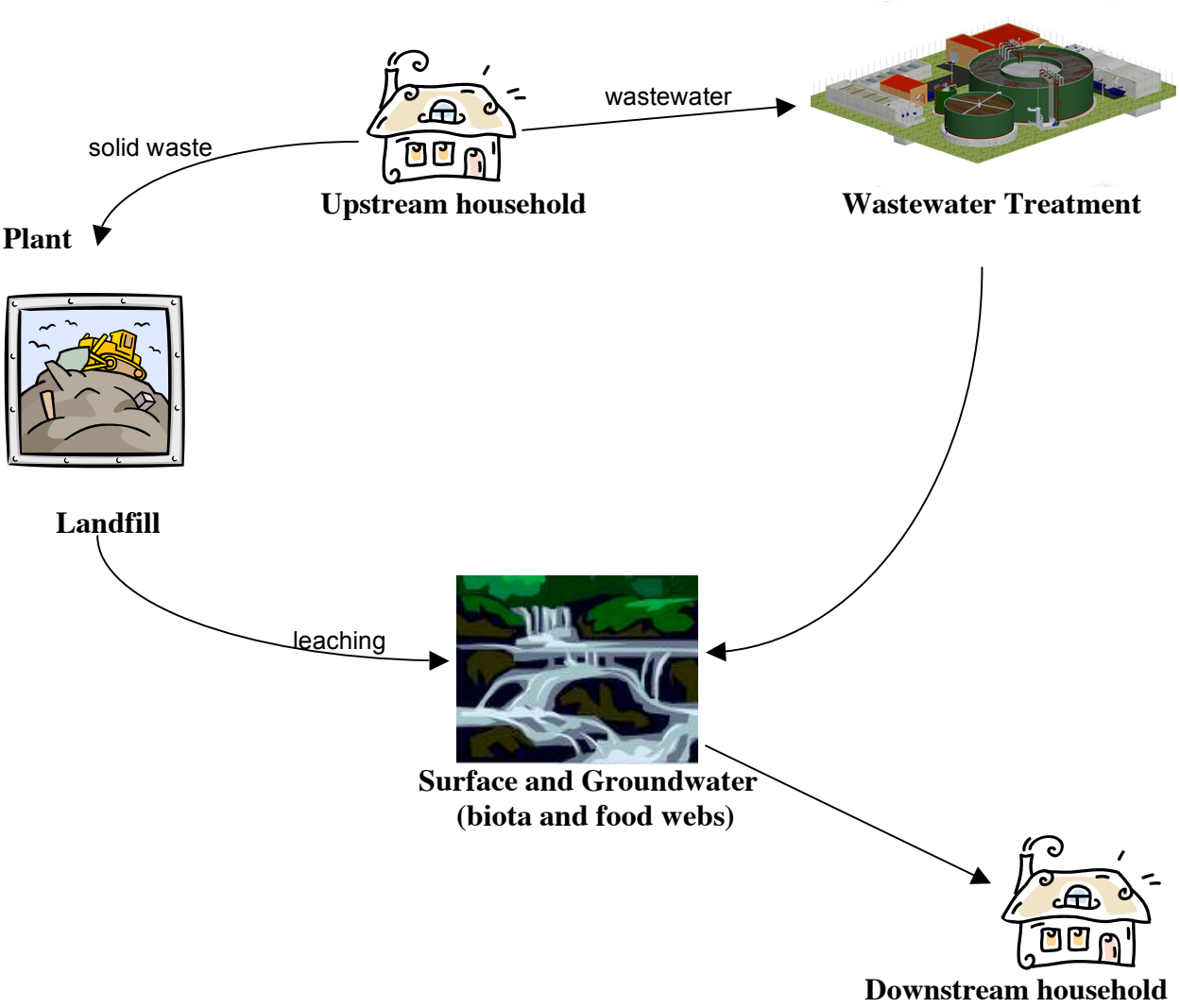
Food sources of CECs likely enter wastewater from a household via toilet waste following ingestion. Note that this does not mean that CECs pass through a person's system without metabolism, retention, or other processing; the consumer may in fact be subject to some effects of CECs (discussed further in Chapter III). Food-based CECs include:

- Packaged foods, which can contain antimicrobial preservatives such as BHA.[8]
- Plasticizers used in hard plastic water bottles and epoxy can linings, such as Bisphenol A.
- Preservatives such as parabens.

CECs enter wastewater from household products via automatic washer, sink, and shower drains. CECs that are commonly found in household products are:

- Surfactants, *e.g.*, nonylphenol and octylphenol, in detergents and dishwashing liquids.
- Triclosan in laundry and dishwashing detergents and soaps.[8]
- Parabens.

Figure 1. Simplified representation of water pathways upon leaving a source household.[10] This project is focused on the wastewater pathway, although landfills and septic systems can leach CECs into soil and groundwater, and incineration can volatilize CECs.



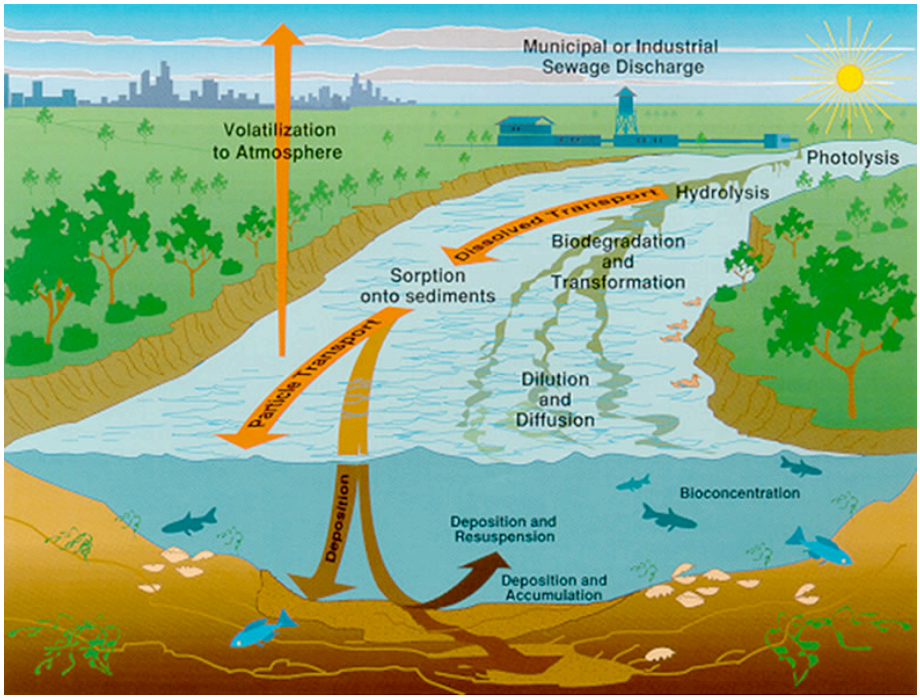
Residential wastewater undergoes treatment processes (see Chapter IV) that do not remove all CECs. The CECs discharged by upstream households thus still exist in downstream water supplies, either in whole or in part, and local biota, including humans, are then vulnerable to their effects. How stable are these compounds? Do they break down in the water? Are they affected by sunlight or aquatic organisms? What if a fish ingests water containing CECs, and then we eat the fish?

Environmental Fates of CECs

Environmental fate refers to the processes by which a chemical moves through and is transformed by the environment.[11] See Figure 2 for a schematic of the processes that we consider here. For starters, how long does it take for these chemicals to break down? We can get a reasonable idea of how long it takes from the *half-life* value, which the time it takes for a

certain quantity to degrade to half of its initial value. Degradation rates affect the potential of a toxic compound to travel long distances: the longer the degradation rate, the longer the potential

Figure 2. Processes controlling the fate of organic contaminants.[12]



distance traveled. And, in the case of CECs, the longer the degradation rate, the longer duration that the compound may be of environmental concern.

Some transformative processes are chemical in nature such as photodegradation (photolysis), biodegradation, and hydrolysis.

Photodegradation is the breakdown of a chemical upon exposure to sunlight.

Biodegradation is the breakdown of a chemical into other compounds by bacteria or other microbes. Note that even if a compound is biodegradable, this does not necessarily diminish its status as a CEC, partly because biodegradation may require particular environmental conditions, including a minimum duration, and also because some CECs are released to the environment in a more or less steady stream.

Hydrolysis is the dissociation of a chemical in water.

A CEC may change from a liquid to a gaseous form through *volatilization*. Volatilization will introduce a CEC to the atmosphere and thus a new means of transport. If a compound has low volatility, its presence in the atmosphere and potential for long-range transport might be considered minimal. In contrast, if a compound is highly volatile it might have an appreciable

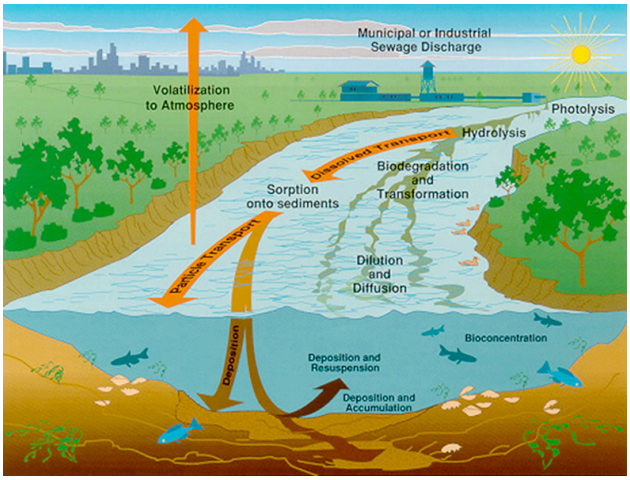
presence in the atmosphere and be of concern for transport over long distances and, importantly, for deposition in some other ecosystem.

Bioaccumulation is the concentration of a chemical in the tissue of aquatic animals such as insects and fish that ingest it, and is one avenue by which CECs may contaminate terrestrial (land-based) communities, as some birds and mammals depend on fish for food. The transfer and accumulation of a CEC as it travels up the food chain is called *biomagnification*, which results in higher concentrations of the chemical at higher trophic levels. Polar bears in East Greenland, for example, that consume ringed seals have greater concentrations of brominated and chlorinated compounds in their tissue than the ringed seals they feed on.[13]

III. EFFECTS OF CECS

The concentration at which a particular compound may pose a health or environmental risk is not often determined. In water samples where pharmaceutical and personal care products (PPCPs) have journeyed through the treatment plants, excess chemicals and hormones are present in our waterways, and there is a consistent correlation to the adverse effects on humans, wildlife, and

Figure 2. Processes controlling the fate of organic contaminants.[14]



the ecology of the surrounding natural environment. The power of these contaminants is not to be taken lightly; one teaspoon of a mixture of PPCPs poured into an Olympic sized swimming pool could have adverse effects upon the life and offspring of a living organism forever.[15]

Human Health

There is limited conclusive research on what contaminants of emerging concern do to the human system. EDCs are addressed as priority substances by the U.S. Food Protection Act, The Safe Drinking Water Act and Amendments, and a 2001 European Union Directive. The EPA has developed the Contaminant Candidate List (CCL), listing those that are suspected of having negative health effects on humans, but are yet to be thoroughly researched.

The broadly defined group of CECs can be broken down into three umbrella categories: endocrine disrupting chemicals (EDCs), PPCPs, and toxic chemicals, with considerable overlap among the three. For example, phthalates are a form of artificial perfume fragrance (PPCP), and they can lead to improper fetal development and endocrine disruption (EDC). PCBs are endocrine disruptors and are considered toxic chemicals by the UN (UNDPI, 1997).

In 2002 the USGS stated "knowledge of the potential human and environmental health effects of these ninety-five chemicals [measured in drinking water in this study] is highly varied; drinking-water standards or other human or ecological health criteria have been established for fourteen chemicals. Measured concentrations rarely exceeded any of the standards or criteria. Thirty-three are known or suspected to be hormonally active; forty-six are pharmaceutically active. Little is known about the potential health effects to humans or aquatic organisms exposed to the

low levels of most of these chemicals..." [16] A 2003 study concluded that hormones and other pharmaceutical products in drinking water were causing unnaturally high levels of estrogen in humans.15

EDCs are demonstrated to have both short- and long-term effects on the endocrine and development systems. The endocrine system is an intricate and delicate system that regulates development, growth, reproduction, and behavior. Synthetic and altered natural chemicals have the ability to mimic these endocrine hormones and will bind directly to hormone receptors, thus disrupting natural processes. These endocrine hormone mimics may also indirectly relay molecular messages through the complex array of cellular proteins that activate genes and alter cellular growth and division.15

Ecosystems and Wildlife

The chemicals that effect wildlife are virtually the same as those that touch humans, and often have the same physiological effects, though often to a more powerful extent because they become biomagnified in the environment. Many different chemicals have been found to have both similar and interrelated effects on wildlife.

Antimicrobial agents may adversely affect the microbial processes in wastewater treatment, soils, and sediments by interfering with and negatively impacting processes such as nitrification and biogeochemical cycles. When microbial activity within the soil is hindered, indicators are decreased oxygen uptake and carbon dioxide release from the soil.

IV. MUNICIPAL WASTEWATER TREATMENT

Sewage, which includes liquid waste (including household chemicals) from toilets, baths, showers and kitchens, typically will meet one of several fates. Sewage may flow into a nearby septic tank, be treated by bio-filtration, be sent to aerobic treatment systems (ATS),[†] or may be diverted to a municipal treatment facility. This last option is the subject of this chapter.

There are two types of treatment facilities: those whose output is drinking water, and those with a wastewater output. The purpose of a **drinking water** plant is to release water that will be clean for human consumption. The plant must be above the floodplain with an intake point preferably 15-20 feet higher in elevation than the discharge point to minimize the need for pumps. Factors such as availability of resources (water and power), land costs, and taxes may influence the location of the plant. Typically, the source of water for drinking water treatment is a nearby river.

Wastewater treatment plants receive sewage directly from residences and commercial and industrial establishments such as hospitals and factories. Wastewater treatment facilities are located on topographically low ground and in proximity to rivers or shorelines to facilitate discharge. In addition, wastewater treatment plants are powered by gravity.

The City of Golden has had rights to the water of Clear Creek since the early 1800s, though the city typically uses only 3 million gallons a day, less than the quantity allowed. The City has its own drinking water treatment facility on Clear Creek, with a capacity to treat 12 million gallons a day. Pre-treatment water is stored in a pond next to the Creek, where larger solids settle to the bottom and out of the water profile. The Golden plant is topographically lower than many of the residences it serves and thus uses a series of pumps to convey the water to users. The plant uses flocculation, sedimentation, filtration, and chemical treatment of water to prepare the water for release for drinking.[17]

The City of Golden contracts their wastewater treatment to a facility north of Coors Brewery. Topographically this area is lower than most of Golden, which allows wastewater from residences and businesses to funnel to the plant via gravity. After treatment (methods discussed below), the water is released back into Clear Creek near the brewery.

Ultimately, the responsibility of water distribution and discharge rests on local jurisdictions, which must adhere to both state and federal requirements. Typically a local government will manage and maintain its own water treatment and distribution, although they may choose to contract private companies for any component of water treatment including construction of treatment plants, maintaining treatment standards, treating influent sewage or water, or management. Following is a brief description of wastewater treatment, with specific references to Golden where applicable.

Pre-Treatment

[†] An ATS is a small sewage treatment system that is similar to a septic system but utilizes aerobic activity. Small rural communities often implement ATSs to process wastewater from several homes.

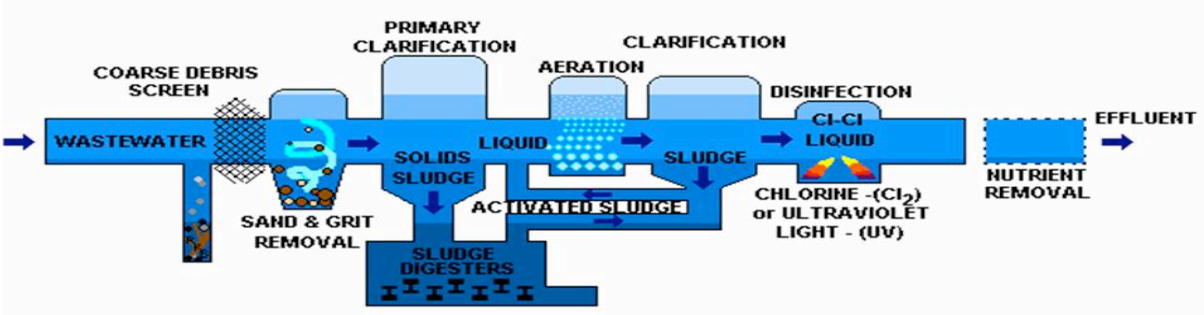
Pre-treatment is the first phase of wastewater treatment in which all large objects in the water are removed. Removing the large objects prevents them from becoming lodged in the treatment facility's smaller mechanisms later. *Screening*, via a screen affixed to the intake pipe of a wastewater treatment plant, clears large objects such as rags, cans, dead animals, and food debris ("coarse debris screen" in Figure 3). Buildup may be cleaned manually or with a mechanical bar. The solids collected are disposed of in a landfill or incinerated.

De-gritting removes large grit and sand from incoming wastewater by controlling the velocity of water flow so that grit and sand may sink and be subsequently removed ("sand and grit removal" in Figure 3). Following de-gritting, other solids in the water, usually organic, continue into primary treatment. The collected sand and grit is sent to a landfill or is cleaned with a sand washer (grit classifier).

Primary Treatment

Primary treatment separates and removes solids and greases from wastewater in order to homogenize it ("primary clarification in Figure 3). Oil, grease, and solids of lower mass float to

Figure 3. Wastewater treatment plant.



the surface during primary treatment and are skimmed off with automatic skimmers. Heavier solids sink into sedimentation tanks to form a liquid sludge.

Primary clarifiers and sedimentation tanks allow suspended solids to separate from water by coagulation and flocculation. A negative charge on the surface of water stabilizes the finely dispersed suspended solids (*colloids*), thus keeping them separated. *Coagulation* is induced by rapidly mixing cationic coagulants through the water to reduce the negative charge on the surface, allowing particles to bind together into *flocs* (also known as *organic particles* or *flakes*).

Flocculation takes place after coagulation. Polymers are added to the wastewater to bridge the flocs into aggregates. The aggregates will either float and be scooped from the water, or are heavy enough to sink into sedimentation tanks.[18] Sediments are disposed of via a sediment digester, or are incinerated.[19]

Secondary Treatment

Secondary treatment is the removal of dissolved and suspended biological matter (which is a type of organic matter) by aerobic biological processes. Waterborne organisms such as protozoa and bacteria are added to the wastewater, where they feed on the soluble organic contaminants.

Other, less soluble contaminants are bound into floc. The organisms are then separated out of the water before the water is discharged into the environment, or to tertiary treatment.

The objective of secondary treatment is to minimize Biochemical Oxygen Demand (BOD), which is a measure of how fast biological organisms use up the oxygen in water. If the biological matter is removed from wastewater, then the BOD will decrease correspondingly.

Different types of secondary treatment systems are discussed briefly below, the most common being fixed film and attached growth systems.

- Fixed film and attached growth systems allow biomass to grow on a fixed or rotating area that the wastewater will trickle or pass over. Fixed film systems are more able to cope with drastic changes in the amount of biological material in wastewater and can provide higher removal rates for organic material and suspended solids than suspended growth systems. Suspended growth systems allow the biomass to be mixed with the sewage water. Activated sludge is an example of this system.

Attached Growth Systems and Aeration

- Surface-Aerated Basins use motor-driven floating aerators. This system is the most successful in removal of BOD. Motor driven aerators are used on the surface of the wastewater and transfer oxygen into the wastewater to drive the biological oxidation processes, while rotating and providing movement to mix the air, wastewater, and biomass.[20]
- Filter Beds offer the oldest form of treatment. Trickling filter beds are built of limestone pieces, carbonized coal or plastic media. Biofilm of bacteria and protozoa forms on the top of this media and eats the organic content of wastewater as it is spread over the top of these beds. Larger organisms such as worms graze the biofilm to maintain its thickness; if the biofilm becomes too thick, then water cannot pass through. The wastewater then filters down into drains located below the filter beds. The drains allow air to filter up into the beds, maintaining an aerobic system.
- Biological Aerated filters (BAF) biological carbon reduction, nitrification, denitrification. Reactor filled with filter media, media in suspension or on a gravel layer at the bottom of the filter. The media supports a highly active biomass and filters suspended solids.

Suspended Growth Systems

- The Conventional Activated Sludge (CAS) process utilizes dissolved oxygen to promote the growth of biological floc. Sludge liquor, which is the solids separated from raw wastewater, is "activated" with the addition of dissolved oxygen by means of aeration. Oxygen enlivens bacteria and protozoa within the sludge and allows for them to become active enough to eat biological matter that persists in the water after it has passed primary treatment. Activated sludge, air, and primary effluent are mixed for several hours so that the bacteria can consume any remaining dissolved organic materials. This process, under perfect conditions, will promote denitrification of the wastewater and ammonia that is converted to nitrogen gas.[21]
- A membrane bioreactor (MBR) is advanced technology that combines biological treatment with membrane filtration and can offer several advantages to conventional wastewater

treatment including a reduced footprint, consistence, and superior effluent water quality. MBR uses low pressure micro-filtration or ultra filtration membranes immersed in the aeration tank. This design allows for a higher concentration of sludge in the system, thus leading to a higher rate of removal of soluble and particulate biodegradable materials within a smaller tank volume. Effluent that is produced by an MBR is of such high quality that water may be directly reused for such needs as irrigation, Tertiary treatment and final clarification are not a necessity. Effectiveness of removal of emerging contaminants is unproven to this point.

The final phase of secondary treatment is *secondary sedimentation*. This occurs after filtration and is when any filtered materials are removed from the water, and biological floc is allowed to settle out of the water.

Tertiary Treatment

Tertiary treatment is traditionally the final phase of water treatment, in which any residual contaminants are removed and water is prepared for re-release to the environment. Tertiary treatment utilizes chemical, physical, or both methods to perform final water purification. *Super chlorination*, *activated carbon*, *salt water conversion* or *precipitation softening* are common methods of tertiary treatment.

There are filtration systems that utilize sand or activated carbon. When sand is used, residual suspended matter is removed. Activated carbon is derived from natural material such as lignite, bituminous coal, wood, or coconut shell and is activated by steam. Each different type of carbon will have a different adsorption property, so different combinations of carbon are used to remove different types of residual toxins within water. Activated carbon is hydrophobic (water-repellent) and oleophilic ("oil-loving"), so when water passes over activated carbon, it is repelled, while oils adhere to the carbon and are thus removed from the water. Activated carbon removes chlorine, polychlorinated biphenyls (PCBs), and atrazine from water.[22]

Lagooning and constructed wetlands employ artificial recreation of the natural environment. In these processes, water is put to sit in manmade ponds filled with macrophytes and filter-feeding invertebrates. The macrophytes foster an extremely aerobic environment, which inherently improves the water quality, while the invertebrates filter out any remaining micro-particles.[23]

Nutrient removal mitigates nutrients such as nitrogen and phosphorous, which are often found in excess in water. Nitrogen can be removed through biological oxidation while phosphorous is most successfully removed by chemical precipitation or by using phosphorous-accumulating bacteria, known as enhanced biological phosphorous removal.

Disinfection - http://consolidatedtreatment.com/manuals/Fact_sheet_chlorine_disinfection.pdf

After tertiary treatment, water is considered safe for rivers, lakes, irrigation, groundwater recharge, and agricultural purposes, or it may be stored until it is distributed. The City of Golden uses super chlorination and tests water throughout the city for quality assurance.

Technology for CECs

Wet air oxidation (WAO) use temperatures and pressures over 102 degrees Celsius and 10 bar, respectively, and air or oxygen as oxidant. It is a hydrothermal treatment. This is particularly useful in toxic wastewater treatment. This system must be maintained under pressure to avoid excessive evaporation of water. This type of system has been in use for over 60 years and results vary on the success of removing contaminants of emerging concern while being energy inefficient.[24]

Reverse Osmosis (RO) is used to filter inorganic material by way of physical separation. Pretreated source water is delivered at a moderate pressure against a semipermeable membrane. The membrane allows water of very low mineral content to pass through, while it rejects solute ions and molecules. RO removes radionuclides, nitrates, arsenic, pesticides, and viruses. Nanofiltration (NF) is similar to RO, but it filters through a membrane at a lower pressure. This allows it to treat water with a higher organic content.[25]

Advanced oxidation process (AOP) is the application of photocatalysis, ozonation or electrochemical oxidation utilizing electron beams, UV light or ultrasound pulses to obtain high oxidation rate through the generation of free OH radicals, the neutral form of the hydroxide ion. OH radicals are highly reactive, but cause damage to proteins and drive the oxidation processes. Photocatalysis can result in considerable economic savings by using sunlight or near UV light. Ozonation is a powerful oxidizing agent demonstrated to be an effective process for removing refractory and toxic chemicals. Studies have proven treatment to be extremely effective when dosing wastewater with a dissolved organic compound and ozonation in the tertiary treatment. An ozone destruction unit is used to collect and properly dispose of collected ozone chemicals.[26]

Effectiveness of Water Treatment Technology

CECs from pharmaceuticals, personal care products and cosmetics, and household products may not exist in high concentrations in wastewaters and therefore be difficult to eliminate. Also, the typical efficiencies of conventional technologies used by sewage and drinking water treatment plants may not be enough to completely remove contaminants. In fact, the overall removal rates of pharmaceuticals and personal care products (PPCPs) in full scale sewage treatment plants vary widely.[27]

Unfortunately, most of the existing wastewater treatment plants are not effective barriers for some CECs such as estrogen, which means these contaminants are continually released into the environment via the wastewater treatment plant effluent. It is possible that post-treatment techniques such as ozonation, membrane filtration, and sorption on activated carbon may be effective methods to eliminate CECs but these procedures are costly to implement and could increase carbon emissions.

V. LEGISLATION / REGULATION

Because the focus of this book is contaminants of *emerging*, not established, concern, state and federal legislative bodies have yet to definitively regulate CECs. Some CECs have, nonetheless, been subject to regulation as a result of their inclusion in household products, cosmetics and personal care products, and pharmaceuticals.

Federal Wastewater Regulations

The Safe Drinking Water Act (SDWA) and the Clean Water Act (CWA) are the primary legislative vehicles establishing water quality standards at a federal level. While the SDWA specifically addresses drinking water, the CWA regulates the discharge of pollutants, and the contaminants regulated by these statutes have increased with time. Industrial facilities that send waterborne waste to municipal treatment plants must pretreat the waste and ensure that it will not damage treatment facilities.[28] The National Pollution Discharge Elimination System (NPDES) controls the discharge of industrial wastes into municipal sewers. Any industrial waste that would harm a municipal treatment facility needs to be pre-treated onsite before release.

In addition, the U.S. Environmental Protection Agency (EPA) has several Contaminant Candidate Lists that are used as guides for determining which drinking water contaminants need to be federally regulated. The EPA has also developed and continues to develop Effluent Limitation Guidelines specifically for industrial regulation as well as for drinking water. The Industrial Regulations address wastewater discharges to surface waters and publicly owned treatment works (*i.e.*, municipal sewage treatment plants).[29] The Drinking Water Treatment Guidelines include standards for wastewater discharges from facilities that manufacture chlorine and certain chlorinated hydrocarbons, the direct discharge to surface water of byproducts from drinking water treatment, and the indirect discharge of treatment byproducts to wastewater treatment plants. These "Drinking Water Treatment Effluent Guidelines" include all drinking water facilities that discharge suspended solids, aluminum salts, organic matters, radionuclides, iron salts, polymer, lime, arsenic, desalination concentrates, or other residuals.[30] Lastly, the EPA is responsible for reviewing and approving the analytical methods that are used when analyzing water samples.

Colorado Wastewater Regulation

The Colorado Department of Public Health and Environment is responsible for creating, adopting, and enforcing public drinking water regulations in Colorado,[31] including those mandated by the Clean Water Act.[32]

California,[33,34] Maine,[35] and Oklahoma,[36] have all instituted pharmaceutical take-back programs. In addition to protecting our environment, other reasons for pharmaceutical take-back programs include preventing childhood overdoses, reducing drug theft, limiting the accumulation of drugs (by the elderly, *e.g.*), having more control over international drug donations, and eliminating waste in the national health care systems.[37]

In addition, California has implemented the Safe Cosmetics Act (2005), which states that "some cosmetic products contain substances known or suspected to cause cancer and reproductive toxicity."[38] It requires that cosmetics manufacturers provide the state health authorities with

documentation identifying any product they produce as containing substances, which may cause cancer or reproductive toxicity. Further, Illinois' Green Cleaning Schools Act (2007) requires that all primary and secondary public schools and non-public schools with 50 or more students purchase and use environmentally-safe cleaning supplies.[39]

Local Directives

Some examples of municipal and county efforts to clean up wastewater supplies include:

- Boston (MA), whose 2008 Green Cleaning Policy established buying guidelines for all city-managed building maintenance programs and new contracted services. Criteria included meeting Green Seal Environmental Standard (GS37) for cleaners used for industrial or institutional purposes.[40]
- San Mateo County (CA) has run a pharmaceutical take back program since September 2006. Disposal sites are located in local police headquarters to collect both controlled and non-controlled substances.[41]
- Berkeley's (CA) 2007 Green Pharmacy take-back program.[42]

VI. PREVENTION AND MITIGATION

Eliminating CECs entirely from our water supplies, if possible (see Chapter IV), would be costly and time-consuming, prompting us to consider prevention and mitigation as valuable methods for reducing CECs in waterways. More cost- and time-effective than upgrading water treatment plants would be if consumers minimize their use of antibacterial soaps, disinfectants and other personal care products (PCPs).

One difficulty of mitigating the effects of PCPs, including cosmetics, on our surface waters is the fact that many of the constituents of a PCP provide a desirable quality, such as fragrance. Commonly "fragrance" is listed as an ingredient, but not the source of the fragrance. Polycyclic and nitro musk fragrances are commonly used as fragrance in PCPs, chemicals that persist and bioaccumulate in the environment.[43]

Related to this is the fact that unregulated labeling can make it hard to identify products that contain these harmful chemicals. This is true for PCPs and household cleaning products, making it difficult for consumers to identify which chemicals are in a cleaning product and how to choose more environmentally friendly products.

Two ways to minimize CECs from our local waters are to

- Support strict labeling regulations for the ingredients used in PCPs so that consumers can make more informed choices.
- Try to purchase products with a Green Seal or DfE (EPA's Design for the Environment) logo.
- Use non-toxic alternatives to personal care and household products.
- Introduce less of the ingredients in any personal care or household product to the environment simply by using smaller amounts and use them less frequently.

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Survey

Conducted by the *Institute for Environmental Solutions*

761 Newport Street, Denver CO 80220
(303) 388-5211 www.i4es.org info@i4es.org

The Institute for Environmental Solutions needs your help to uncover attitudes towards the environment, community, and use of household and personal care products.

Directions:

This survey is for the primary shopper in the household. All answers will be confidential. Please complete both sides and answer all questions. The survey is divided into two sections:

1. Personal habits – this is about you.
2. General information about the entire household.

PART 1: *Personal Habits*

1. How many cups of coffee, tea, soda, energy drink, or other caffeinated beverage do you drink on average each day?
0 1 - 2 3 - 5 6 - 8 9 - 11 12+

2. Do you have a *plastic* water bottle (reusable OR disposable) that you use? Circle one:
ALWAYS SOMETIMES RARELY NEVER I'M NOT SURE

3. Do you purchase personal care products (e.g. lotion, shampoo, hand soap, cosmetics) that are scented with fragrance?
ALWAYS SOMETIMES RARELY NEVER I'M NOT SURE

4. If so, are your fragrances typically natural or synthetic?
NATURAL SYNTHETIC I'M NOT SURE

5. Do you purchase personal care products (e.g. lotion, shampoo, hand soap, cosmetics) that are paraben-free?
ALWAYS SOMETIMES RARELY NEVER I'M NOT SURE

6. How many times per week do you wash your hair? **0 1-2 3-5 6-7 8+**

PART 2: *Household Habits*

1. Does your household purchase antibacterial soap?
YES NO I'M NOT SURE

2. When purchasing packaged foods, do you check the label for preservatives?
ALWAYS SOMETIMES RARELY NEVER N/A

3. Estimate the number of canned beverages (soda, beer, other canned drinks) that your household consumes per **week**:
None 1-12 (two 6-packs) 12-24 25-48 More than 48 (eight 6-packs)

4. What brand of *laundry detergent* does your household use?

5. What is the average number of laundry loads your household washes per week?
0-1 2-4 5-7 8-10 11-13 14+ n/a

6. How much laundry detergent do you use for a full load?
none ¼ capful/scoop ½ capful 1 capful 2 capfuls 3 capfuls+

Background Information

Gender: **Male** **Female**

Are you the primary shopper in the household? **Yes** **No**

Number of people residing in your home, including yourself: _____

Your age: **18-22** **23-35** **36-50** **51-69** **70+**

The age of each child under the age of 18 residing in your home: _____

Your highest level of education: **Less than high school** **High school**
Vocational/2-year college **4-year college** **Postgraduate**

Current household income:
Less than $25,000 **$25,001-50,000** **$50,001-75,000**
$75,001-100,000 **$100,001+**

To mail, fold here first.

7. If you knew there was an ingredient in your detergent that was harmful to the environment, would you be less likely to purchase it? **YES** **NO** **I'M NOT SURE**

8. Would you pay $2 more per bottle/box for a detergent without any harmful ingredients if you knew that your current detergent was harmful to the environment? **YES** **NO** **I'M NOT SURE**

9. What brand of *dishwasher detergent* does your household use?

10. How many times per **week** do you run your dishwasher?
n/a **0-1** **2-4** **5-7** **8-10** **11-13** **14+**

Fold here second. Seal with two pieces of tape.

INSTITUTE FOR ENVIRONMENTAL SOLUTIONS
scientific solutions for a better environment

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First Class
Stamp Here

Institute for Environmental Solutions

761 Newport Street

Denver, CO 80220-5555

PART 2: HOUSEHOLD HABITS *(CONTINUED)...*

4. What brand of laundry detergent does your household use? _____

5. What is the average number of laundry loads your household washes per week?

0-1	2-4	5-7	8-10	11-13	14+	N/A

6. How much laundry detergent do you use for a full load?

None	1/4 Capful/Scoop	1/2 Capful	1 Capful	2 Capfuls	3+ Capfuls

7. If you knew there was an ingredient in your detergent that was harmful to the environment, would you be less likely to purchase it? Yes: _____ No: _____ I'm Not Sure: _____

8. Would you pay $2 more per bottle/box for a detergent without any harmful ingredients if you knew that your current detergent was harmful to the environment? Yes: _____ No: _____ I'm Not Sure: _____

9. What brand of dishwasher detergent does your household use? _____

10. How many times per week do you run your dishwasher?

N/A	0-1	2-4	5-7	8-10	11-13	14+

FOLD 2

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761 Newport Street
Denver, CO 80220-5555

Staple or Tape to Seal. Stamp and Mail.

FOLD 1

Background Information

Do you live in Golden? Yes: _____ No: _____

Gender: Male: _____ Female: _____

Are you the primary shopper in the household? Yes: _____ No: _____

Number of people residing in your home, including yourself: _____

Your age:

18-22	23-35	36-50	51-69	70+

The age of each child under the age of 18 living in your home: _____

Your highest level of education:

Less Than High School	High School	Vocational/2-Year College	4-Year College	Postgraduate

Current household income:

Less Than $25,000	$25,001 - $50,000	$50,001 - $75,000	$75,001 - $100,000	$100,001+

Thank you for completing this survey. For a free copy of IES's Contaminant Free Shopping Guide, please write your email address here:_____. Or email us at: Solutions@i4es.org.

Survey

Conducted by the Institute for Environmental Solutions

761 Newport Street, Denver CO 80220
303.388.5211 | www.i4es.org

The Institute for Environmental Solutions (IES) and the City of Golden need your help to uncover attitudes towards the environment, community, and use of household and personal care products.

Directions:

This survey is for the primary shopper in the household. All answers will be confidential. Please complete both sides and answer all questions. Completed survey may be mailed to IES. This survey is also available online at **www.i4es.org** – click on the ***"Please Take Our Latest Survey"*** link.

The survey is divided into two sections. The first section is about your personal habits and the second section is general information about your entire household. Please answer all questions.

Part 1: Personal Habits

1. How many cups of coffee, tea, soda, energy drink, or other caffeinated beverage do you drink on average each day?

0	1-2	3-5	6-8	9-11	12+

2. Do you have a plastic water bottle (reusable or disposable) that you use?

Always	Sometimes	Rarely	Never	I'm Not Sure

3. Do you purchase personal care products (e.g. lotion, shampoo, hand soap, cosmetics) that are scented with fragrance?

Always	Sometimes	Rarely	Never	I'm Not Sure

4. If so, are your fragrances typically natural or synthetic?

Natural	Synthetic	I'm Not Sure

5. Do you purchase personal care products (e.g. lotion, shampoo, hand soap, cosmetics) that are paraben-free?

Always	Sometimes	Rarely	Never	I'm Not Sure

6. How many times per week do you wash your hair?

0	1-2	3-5	6-7	8+

7a. Have you attended any IES workshops or seen any IES displays on Contaminants of Emerging Concern at the library, the American Mountaineering Center or in local businesses? Yes: _____ No: _____

7b. If yes, what events did you attend or which displays have you seen? _____

7c. If yes, are you doing anything differently as a result? _____

8. Do you read the Golden Informer? Yes: _____ No: _____

Part 2: Household Habits

1. Does your household purchase antibacterial soap?

Yes	No	I'm Not Sure

2. When purchasing packaged foods, do you check the label for preservatives?

Always	Sometimes	Rarely	Never	N/A

3. Estimate the number of canned beverages (soda, beer, other canned drinks) that your household consumes per week:

None	1-12 (two, 6-packs)	12-24	25-48	More than 48 (eight, 6-packs)

Please Turn Over

CONTAMINANTS of
EMERGING CONCERN

761 Newport Street • Denver, Colorado • 80220-5554
303 388 5211 • www.InstituteForEnvironmentalSolutions.org

Contaminants of Emerging Concern (CECs)
Reading and Viewing List

Available at Jefferson County Public Libraries

Information about CECs

The Body Toxic: how the hazardous chemistry of everyday things threatens our health and well being by Nena Baker. 2008
615.9 BAKER

Chasing Molecules: poisonous products, human health, and the promise of green chemistry by Elizabeth Grossman. 2009
615.902 GROSSMAN

Living Downstream by Sandra Steingraber. 1997
616.994071 STEINGRABER

Our Stolen Future by Theo Colborn. 1997
615.902 COLBORN

Poisoned Waters produced by WGBH Boston. 2009
DVD 363.7394 POISONED
(view online at: www.pbs.org/wgbh/pages/frontline/poisonedwaters)

Tapped produced by Atlas Films. 2010. (view online at: www.tappedthemovie.com)

Concern over canned foods, Consumer Reports, December 2009, page 54
www.consumerreports.org/health/healthy-living/health-safety/bpa/overview/bisphenol-a-ov.htm

Alternatives to CECs

Easy green living : the ultimate guide to simple, eco-friendly choices for you and your home by Renée Loux. 2008
640 LOUX

Green Cleaning for a Healthy Home produced by Saul Nir & Ari Firestone.
DVD 648.5 GREEN

Green Cleaning for Dummies by Elizabeth B. Goldsmith with Betsy Sheldon. 2008
648.5 GOLDSMITH

Green Housekeeping: in which the nontoxic avenger shows you how to improve your health and that of your family while you save time, money, and, perhaps, your sanity by Ellen Sandbeck. 2008
648.5 SANDBECK

The Naturally Clean Home: 150 super-easy herbal formulas for green cleaning by Karyn Siegel Maier. 2008
648.5 Siegel-Maier

Squeaky Green: the Method guide to detoxing your home by Eric Ryan and Adam Lowry. 2008
648.5 RYAN

The Toxic Consumer: living healthy in a hazardous world by Karen Ashton and Elizabeth Salter Green. 2008
615.902 ASHTON

Websites

U.S. Environmental Protection Agency/ Pharmaceuticals and Personal Care Products, www.epa.gov/ppcp
U.S.G.S./ Emerging Contaminants in the Environment, http://toxics.usgs.gov/regional/emc/index.html

Prepared by the Institute for Environmental Solutions, www.i4es.org
February 2010

Special thanks to:

JEFFERSON COUNTY PUBLIC LIBRARY
DISCOVER THE POSSIBILITIES

Golden Library • 1019 10th St. • Golden, CO 80401 • 303-235-JCPL (5275)
Online at http://jefferson.lib.co.us/locations/gn.html

INSTITUTE FOR
ENVIRONMENTAL SOLUTIONS

Keep the Water Supply Clean

OUR MISSION - The Institute for Environmental Solutions is an independent non-profit 501(c)(3) organization that engages stakeholders to deliver technically sound solutions to complex environmental and health problems -- without unwanted side effects.

WE BELIEVE -There is an urgent need to identify, test, and implement sound, scientific and cost-effective solutions to environmental problems that aren't being addressed.

OUR APPROACH

Communicate with and educate residents, community groups, businesses, government agencies, scientists, and other stakeholders. Provide opportunities to the community to make quantifiable and measurable impacts to improve the environment.

CONTAMINANTS OF
EMERGING CONCERN

The Contaminants of Emerging Concern (CEC) Project in Golden

The Contaminants of Emerging Concern Project: Linking Science to Effective Action addresses contamination from pharmaceutical and household products in waterways. As a result of everyday household use, trace amounts of chemicals, known as Contaminants of Emerging Concern (CECs), from consumer products are accumulating in downstream-water sources. Traditional wastewater treatment does not effectively remove these CECs, allowing their release into the environment even after water has been treated. Many CECs are known or suspected toxins or endocrine disruptors (interfering with hormones) and may be linked to biological abnormalities and mutations in aquatic life and human health risks.

The pilot program in Golden includes education and outreach to reduce and prevent CEC pollution, along with wastewater analysis and community surveys in partnership with regional and local stakeholders and the scientific community.

Why this is important? CECs are a newly recognized environmental threat. This pollution can be prevented and reduced by citizen action. Everyone's chemical footprints add up in our waterways, damaging fish and other wildlife. Educating people on how to shrink their individual footprint is key to reducing CEC pollution.

To learn more please visit **www.i4es.org**

Would you like to host an informational display or a presentation?

Please call IES at 303-388-5211 or **Info@i4es.org**

CONTAMINANTS OF EMERGING CONCERN ARE FOUND IN:

Laundry detergent, antibacterial hand soap, dishwashing liquid, fragranced beauty products such as lotion, shampoo, conditioner and deodorant, cleaning products such as all purpose cleaning spray and glass cleaner, sunscreens and any products with sunscreens, food packaging such as metal cans, plastic water bottles and processed foods

UPCOMING WORKSHOPS AT THE GOLDEN COMMUNITY CENTER:

Visit https://www.goldenrec.com/golden/ or call 303-384-8100 to register.
All workshops: Age: 13 years and older. $10 Material Fee payable directly to instructor.

Tuesday, March 23, 6:00 – 7:15 pm Clean Up your Beauty Routine
Make your own natural beauty products in this hands-on workshop. Find out which commonly used chemicals in some products could be contaminating the water supply. Course 27040

April 27, 6:00 – 7:15 pm Parents of Preschoolers: Child-safe Living and Cleaning
Many chemicals in baby products and cleaning products can harm your child and the environment. Learn how to avoid these chemicals in products you buy. Course 27045

Tuesday, May 18, 6:00 – 7:15 pm Guide to Contaminant-Free Grocery Shopping
Chemical contaminants may be lurking in the food you buy. Learn smarter ways to shop and easy tips to make the most of your money and time. Course 27025

Top Ten Ways to Reduce Your Chemical Footprint

1. Don't buy antibacterial hand soap! The American Medical Association recommends against antibacterial soap because it contains triclosan. All soaps clean the same! Triclosan doesn't protect from the flu and can strengthen bacteria, poison fish and cause thyroid disorders.

2. Avoid toothpaste that contains triclosan. Triclosan can enter your bloodstream through micro cuts in your gums. Toothpaste with triclosan doesn't make teeth any cleaner.

3. Avoid fragrances. Buy unscented products, or ones that are scented with natural scents such as essential oils, instead of artificial fragrance. Certain artificial fragrances are suspected to be harmful to fish and do not readily biodegrade.

4. Buy fresh food instead of packaged or processed food. The inside of metal food cans contain a lining that uses bisphenol A (BPA). The FDA expressed concern over "the potential effects of BPA on the brain, behavior, and prostate gland of fetuses, infants and children."

5. Wash your laundry with half the detergent you use now. Laundry detergent may contain CECs such as artificial fragrance. With less detergent, your clothes will be just as clean.

6. Wear your clothes more than once between washings. This will increase the life of your clothes, and protect the environment from the chemicals in your detergent.

7. Avoid food that contains preservatives. Chemical food preservatives such as butylated hydroxyanisole (BHA) and methylparaben are listed on the ingredients label, so they're easy to avoid. These chemicals end up in the environment and may pose environmental health risks.

8. Wash your hair less often. Many shampoos and conditioners contain CECs. Washing your hair daily can dry it out by removing natural oils.

9. Switch to non-toxic household cleaners. Use non-toxic cleaners like vinegar and baking soda. Ask your cleaning service to use non-toxic cleaners or switch to a non-toxic service.

10. Only run your dishwasher when it's really full. Conserve water and improve downstream water quality by contributing fewer chemicals.

www.i4es.org, Solutions@i4es.org

INSTITUTE FOR ENVIRONMENTAL SOLUTIONS

KEEP THE WATER SUPPLY CLEAN WITH INSTITUTE FOR ENVIRONMENTAL SOLUTIONS (IES)

OUR MISSION - IES is an independent nonprofit 501(c)(3) organization that engages stakeholders to deliver technically sound solutions to complex environmental and health problems – without unwanted side effects.

IES Honored With Golden Sustainability Award

IES has received the prestigious 2010 Sustainability Award from the City of Golden for its demonstrated commitment to the City's sustainability goals. The award recognizes IES's leadership during the past year in reaching out to Golden residents with easy actions they can take to reduce chemical contamination in water.

"By this award, we recognize that IES is helping the City of Golden to meet sustainability goals in the areas of ecosystem health, water quality, and education," said Susan Buhr, Chair of the Golden Community Sustainability Advisory Board.

"This award means a lot to us," said IES Executive Director Carol Lyons. "I am particularly proud of the many graduate student interns and volunteers who helped us reach out to Golden residents over the past year with practical ideas on how their everyday choices can help improve our environment."

Ms. Buhr and Golden Mayor Jacob Smith made the presentation at the awards portion of the City Council's regular meeting on Earth Day, April 22, 2010. Five awards were presented. IES was the only nonprofit organization selected for the honor.

The Contaminants of Emerging Concern (CEC) Project in Golden

CONTAMINANTS OF EMERGING CONCERN

The CEC project addresses contamination from household products in waterways. As a result of everyday household use, trace amounts of chemicals, known as Contaminants of Emerging Concern (CECs), from household and personal care products are accumulating in downstream water sources. Traditional wastewater treatment does not effectively remove these CECs, allowing their release into the environment even after water has been treated. Many CECs are known or suspected toxins or endocrine disruptors (interfering with hormones) and may be linked to biological abnormalities and mutations in aquatic life and human health risks.

Why is this important? CECs are a newly recognized environmental threat. This pollution can be prevented and reduced by citizen action. Everyone's chemical footprints add up in our waterways, damaging fish and other wildlife. There are many easy ways to shrink your chemical footprint, reduce water pollution, and protect human health and the environment.

Scientific solutions for a better environment

UPCOMING WORKSHOPS AT THE GOLDEN COMMUNITY CENTER:

Visit https://www.goldenrec.com/golden/ or call 303-384-8100 to register.
All workshops: Age: 13 years and older. $10 Material Fee payable to instructor.
Tuesday, May 18, 6:00 – 7:15 pm Guide to Contaminant-Free Grocery Shopping Chemical contaminants may be lurking in the food you buy. Learn smarter ways to shop and easy tips to make the most of your money and time. Course 27025
TBD, Clean Up your Beauty Routine – contact IES at cec@i4es.org if interested
Make your own natural beauty products in this hands-on workshop. Find out which commonly used chemicals in some products could be contaminating the water supply.

Sponsor or host a Workshop, Display, or Presentation on reducing exposure to contaminants in household and personal care products…. And reduce water pollution!
IES welcomes Parents, Community Groups, and Business participation. For more information, **please e:mail Info@i4es.org or call 303-388-5211.**

Golden parents learn how close their children come in contact with harmful contaminants

IES's Zoe Keve, Rebecca Tate and Carol Lyons

To help parents understand how to protect their young children from chemicals hidden in their food, toys, and homes, the Institute for Environmental Solutions (IES) organized a workshop last month at the Golden Community Center.

Parents learned that many of these chemicals – such as bisphenol A, which is found in many plastics and the lining of canned foods – are considered Contaminants of Emerging Concern (CECs). CECs get washed down the drain and end up in the water downstream. They have been shown to interfere with the growth and development of wildlife because wastewater treatment plants do not completely remove CECs from drinking water.

These chemicals are found in products such as diaper rash cream, baby lotions, shampoos, insect repellent, sunscreen and canned baby formula. Golden residents came to the workshop because they had heard about chemical contaminants before but weren't sure how to avoid them.

"I have two small children and it's very important to me to be aware of CECs," commented Heather Schneider, a parent of two children under five years old.

There are many safe and effective alternatives to CEC-containing products, some of which can easily be made at home. IES researched and tested recipes for non-toxic alternatives to household cleaners and hand sanitizers that can contain harmful CECs such as synthetic fragrances. Participants made an all-purpose cleaner by filling a one-liter spray bottle with hot water, then added one teaspoon each of borax and vinegar or lemon juice.

When asked if she plans to use her homemade products and make the switch to safe alternatives free of CECs, Schneider said: "Yes, anything that helps my family and environment."

IES's goal is to educate the Golden community about ways they can avoid CECs. Switching to CEC-free alternatives will not only keep chemicals out of their bodies but also out of the water downstream. The next IES workshop is scheduled for May 18 at the Golden Community Center and will focus on shopping strategies for avoiding CECs at the grocery store.

For more information, please visit www.i4es.org/emerging.html.

INSTITUTE FOR ENVIRONMENTAL SOLUTIONS

Keep the Water Supply Clean With the INSTITUTE FOR ENVIRONMENTAL SOLUTIONS (IES)

IES is an independent nonprofit 501(c)(3) organization that engages stakeholders to deliver technically sound solutions to complex environmental and health problems – without unwanted side effects.

CONTAMINANTS OF EMERGING CONCERN

The Contaminants of Emerging Concern (CEC) Project in Golden

The CEC project addresses water contamination from household products. Trace amounts of chemicals, known as Contaminants of Emerging Concern (CECs), from household and personal care products are accumulating in downstream water sources. Traditional wastewater treatment does not remove all of these CECs, but allows their release into the environment following treatment. CECs are known or suspected toxins or endocrine disruptors (interfering with hormones) and may be linked to biological abnormalities and mutations in aquatic life and human health risks. CECs are a newly recognized environmental threat that can be prevented by citizen action. Everyone's chemical footprints accumulate in our waterways, damaging fish and other wildlife. There are many easy ways to shrink your chemical footprint, reduce water pollution, and protect human health and the environment. Use the Shopping Guide on the back to reduce YOUR chemical footprint!

UPCOMING WORKSHOP AT THE GOLDEN COMMUNITY CENTER:

Tuesday, July 13, 6:00 – 7:15 pm

Learn How to Clean Up Your Beauty Routine!

Find out which commonly used chemicals could be contaminating the water supply and how to make your own natural beauty products. Many personal care products contain chemicals that aren't entirely removed in water treatment, so they end up back in drinking water. Learn what to look for and why cleaning up your beauty routine matters for the environment and your health. Participants will make and take home two natural beauty products. Register online at https://rec.cityofgolden.net or call the Community Center at 303-384-8100 Course 27040 Session 2. Age: 13 yrs and older. $10 Fee payable to instructor.

Help Keep The Water Clean! Sponsor or host a Workshop, Display, or Presentation on reducing exposure to contaminants in household and personal care products… And reduce water pollution! IES welcomes parents, community groups, and businesses. For more information, email Info@i4es.org or call 303-388-5211.

To learn more please visit www.i4es.org

Contaminants of Emerging Concern (CECs)

Guide to Contaminant-Free Summer Shopping

Food Products: Food Packaging

Watch Out For:

Bisphenol A (BPA)

Found In:

- Tupperware© brand storage containers (be wary of other brands)
- Hard plastic water bottles, including plastic sport bottles, sippy cups
- Some #7 plastics
- Epoxy liners of steel and aluminum cans, including soup, soda, and coffee
- Cardboard coating for boxed items

How to Avoid It:

- BPA is not listed in ingredients because it is in the packaging of food products
- Avoiding products that contain this contaminant is the best precaution
- Look for products designated BPA free

Alternatives:

- Klean Kanteen© water bottles
- Nalgene© - newer products are labeled "BPA free"
- Eden Organics© brand canned goods (except tomato based products)
- Pomi© brand boxed tomato products
- Fresh produce or dehydrated soups and beans are the safest alternative
- Glass jars
- Polypropylene-lined pouches (#1) for tuna fish and chicken
- Polyethylene-lined Tetra Pak© (#4) boxed soups and broths. Look for brands like Pacific©, Wolfgang Puck©, Swanson© and Dr. McDougall's©,
- Polyethylene Tetra Pak© (#4) juice boxes (instead of cans or plastic)

Where to Find It:

- Grocery stores have many alternative packaging options
- Pomi© tomato products, www.amazon.com, www.pennmac.com/page/29
- Klean Kanteen: REI, www.KleanKanteen.com, Vital Outdoors (Golden)

Personal Care Products: Skin Care

Lotions, Skin Moisturizers

Watch Out For:

- Parabens, fragrance / perfume

Found In:

- Eucerin©, Lubriderm©, Jergens©

Alternatives:

- Whole Foods 365 brand© (Herbal Mint, Grapefruit Citrus, Lavender scent)

Where to Find It:

- Whole Foods Market

Sunscreen

Watch Out For:

- Benzophenone, oxybenzone, fragrance, parabens

Found In:

- Most commercial sunscreens

Alternatives:

- California Baby© SPF 30+ Sunscreen

Where to Find It:

- Whole Foods Market

Face Wash

Watch Out For:

- Fragrance

Found In:

- Neutrogena© Clean & Clear©

Alternatives:

- Thoroughly Clean Face Wash©

Where to Find It:

- Golden Natural Foods

Donate Now

If you value this guide and the important work of the Institute for Environmental Solutions, please lend your support. To support IES, please send donations to: IES, 761 Newport Street, Denver, CO 80220. Credit card donations are welcome at http://www.givingfirst.org/. Type in "IES" to donate. 100% of your credit card donation at GivingFirst.org goes directly to IES.

To learn more please visit www.i4es.org

To learn more please visit www.i4es.org

INSTITUTE FOR ENVIRONMENTAL SOLUTIONS

TEN EASY WAYS TO REDUCE YOUR CHEMICAL FOOTPRINT

1. Don't buy antibacterial soap! The American Medical Association recommends against the use of antibacterial soap in the home because it contains the chemical triclosan. All soap is equally effective at cleaning your skin and eliminating bacteria. Look for soap that does not have "triclosan" listed on the label. It makes bacteria stronger, poisons fish downstream and is linked to thyroid disorders.

2. Don't buy toothpaste that contains triclosan. Check the ingredients before you buy toothpaste. Triclosan can enter your bloodstream through your gums. Triclosan isn't necessary to clean your teeth or gums.

3. Avoid fragrances. "Fragrance" on an ingredient label indicates artificial fragrance. Products without "fragrance" listed as an ingredient are easy to find. Buy soap, shampoo and lotions that are unscented, or that are scented with essential oils, instead of artificial fragrance. Many kinds of artificial fragrances are suspected to be harmful to fish and do not readily biodegrade.

4. Buy fresh food instead of packaged food. The inside of metal food cans contain a lining that uses bisphenol A (BPA). The FDA recently expressed concern over "the potential effects of BPA on the brain, behavior, and prostate gland of fetuses, infants and children."

5. Avoid food that contains preservatives. Chemical food preservatives such as butylated hydroxyanisole (BHA) and methylparaben are listed on the ingredient label, so they're easy to avoid. These chemicals end up in the environment and may pose environmental health risks.

6. Wash your laundry with half the detergent you use now. Laundry detergents often contain harmful chemicals such as artificial fragrances. Your clothes will get just as clean with less detergent. Let your clothes soak before you turn on the washer and spot-clean stains to further reduce the need for detergent.

7. Wear your clothes more between washing. This will increase the life of your clothes, and protect the environment from the chemicals in your detergent. Steaming or hanging previously worn clothes in the bathroom while you shower can freshen the fabric and get out wrinkles.

8. Wash your hair less often. Many shampoos and conditioners contain chemicals that are toxic to the environment. By washing less often, you can reduce your exposure to chemicals and keep your hair healthier.

9. Switch to non-toxic household cleaners. When you clean your home, use non-toxic cleaners like vinegar and baking soda. If you use a housecleaning service, talk to your housecleaner about using non-toxic household cleaners or switch to a non-toxic service.

10. Only run your dishwasher when it's full. You've heard this tip before for water and energy conservation, but it also will improve downstream water quality by contributing fewer chemicals to the water stream.

INSTITUTE FOR ENVIRONMENTAL SOLUTIONS

For more information, or to get involved, visit www.i4es.org/emerging.html, or email CEC@i4es.org.

Bisphenol A (BPA)

Protect Water Quality and Your Health: Avoid Contaminants of Emerging Concern

What is Bisphenol A (BPA)?

- BPA is a plasticizer used in hard plastic water bottles and epoxy can linings.

What's the Harm?

- BPA is an estrogen mimicker which disrupts hormone function in the body.
- BPA exposure is linked to heart disease.
- Animal studies link BPA exposure to:
  - ✓ Infertility
  - ✓ Weight gain
  - ✓ Behavioral changes
  - ✓ Early onset puberty
  - ✓ Prostate and mammary gland cancer
  - ✓ Diabetes

The National Institute of Environmental Health Sciences

Safe and Simple Alternatives

- Avoid aluminum cans and plastic packaging.
- Avoid hard plastic bottles labeled "PC" (Polycarbonate) or "7" unless specified BPA-free. "7" is a miscellaneous recycling designation, so it doesn't always indicate BPA.
- Use and re-use stainless steel water bottles.
- Buy fresh or frozen instead of canned food.

Institute for Environmental Solutions

Contaminants of Emerging Concern (CECs)

Guide to Contaminant-Free Shopping

What are Contaminants of Emerging Concern (CECs)?

As a result of everyday household use, trace amounts of chemicals from consumer products are accumulating in downstream water sources. CECs are known or suspected toxins or endocrine disruptors, meaning they interfere with the normal functioning of hormones, and may be linked to mutations and other biological abnormalities in aquatic life and human health risks. Traditional wastewater treatment does not effectively remove all CECs, allowing their release into the environment even after water has been treated. Scientists have not yet characterized what level of exposure to these suspected toxins and endocrine disruptors is harmful to humans.

Institute for Environmental Solutions

How to Use This Guide

This buyer's guide is intended to help consumers avoid exposure to harmful contaminants through making informed shopping choices. This guide includes a glossary of CECs, and then provides information covering the categories of food and personal care products. The guide provides information about each CEC to watch out for, where it is found, alternative product choices, and local stores to purchase the safer items. Consult this buyer's guide when you are making your shopping list or bring it along to the store to consult for safe product purchases.

Glossary

Parabens: Parabens are an anti-fungal agent used in many cosmetics and personal care products. They are estrogenic, and can affect the endocrine system of both humans and wildlife. Parabens include methylparaben, ethylparaben, propylparaben and butylparaben.

Butylated Hydroxyanisole (BHA): BHA is an antimicrobial preservative used in food and cosmetics. It is suspected to be carcinogenic, toxic, and an endocrine disruptor.

Benzophenone (Oxybenzone, Avobenzone): Benzophenone is a UV blocker used to preserve color and scents in many personal care products. It is an endocrine disruptor, affecting the endocrine system by attaching itself to the receptor sites and mimicking hormonal activity. It has been found to bioaccumulate in fish.

Fragrances: Synthetic or artificial fragrances can be highly toxic, and can accumulate in the environment and wildlife. Some fragrances have also been found in human breast milk. Synthetic fragrance is used for its scent, but serves no other useful purpose in products

Triclosan: Triclosan is an anti-microbial chemical commonly found in soaps, and toothpastes. It has been shown to bioconcentrate in fish and human breast milk. It is also linked to thyroid disorders in wildlife and can react with sunlight in surface waters to form harmful pollutants.

Bisphenol A (BPA): BPA is a toxic chemical used in certain plastics and resins that are found in bottles, packaging, containers, and metal (stainless steel and aluminum) bottle and can linings. The National Institutes of Health and the Food and Drug Administration are concerned about the potential effects of BPA on the brain, behavior, and prostate gland in fetuses, infants, and young children.

Surfactants: Surfactants are chemicals that break down grease. They are primarily used in laundry detergents and dish soaps. They are often not listed on labels, so it can be difficult to determine if they are present in products. Surfactants break down into chemicals that are toxic to aquatic wildlife. The U.S. Environmental Protection Agency is moving towards regulation of these chemicals. Their use is already restricted in most of Europe.

Atrazine: Atrazine is a pesticide used to prevent broadleaf and grassy weeds. It is used primarily in large farming communities. Traces of the chemical have been found in streams and groundwater in and around these areas. It is a proven endocrine disruptor. Exposure by pregnant women can cause birth defects in children.

Caffeine: Caffeine is a chemical found in coffee, tea and many sodas. Traces of caffeine have been found in groundwater samples. Caffeine activates biotransformation enzymes and can lead to DNA damage.

DEET: DEET is a topical insecticide used in many bug repellent sprays. It can cause skin irritation and, in rare cases, anaphylactic reactions in humans, and can be toxic to fish.

Buyer's Guide

Food Products

Food Packaging

Watch Out For:

Bisphenol – A (BPA)

Found In:

- Tupperware© brand storage containers. Also be wary of other brands of plastic storage containers.
- Hard plastic water bottles, including plastic sport bottles, sippy cups
- Recycling code #7 plastics, unless specified BPA-free
- Epoxy liners of steel and aluminum cans, including soup, soda, and coffee cans
- Cardboard coating for boxed items

How to Avoid It:

- BPA is not listed in ingredients because it is contained in the packaging of food products
- Knowing what kinds of products contain this contaminant is the best precaution
- Look for products designated BPA-free

Alternatives:

- Water bottles
  - Klean Kanteen©
  - Nalgene© - newer products labeled "BPA free"
  - Camelback© bottles - newer products labeled "BPA free"
- Canned goods
  - Eden Organics© brand canned goods (except tomato based products)
  - Pomi© brand boxed tomato products
  - Fresh produce or dehydrated soups and beans are the safest alternative
  - Glass jars
  - Polypropylene-lined pouches (#1) for tuna fish and chicken
  - Polyethylene-lined Tetra Pak© (#4) boxed soups and broths. Looks for Pacific©, Wolfgang Puck©, Swanson© and Dr. McDougall's© brands
  - Polyethylene Tetra Pak© (#4) juice boxes (instead of cans or plastic)

Where to Find It:

- Grocery stores have many alternative packaging options
- Pomi© tomato products, www.amazon.com, www.pennmac.com/page/29
- Klean Kanteen: REI, www.KleanKanteen.com, Vital Outdoors (Golden)

Food Preservatives

Watch Out For:

Butylated Hydroxyanisole (BHA)

Found In:

- Cereals such as Post Fruity and Cocoa Pebbles©
- Dehydrated potatoes, such as Idaho Spuds©
- Boxed pasta meals, such as Kroger Kitchen Creations©
- Boxed stuffing mix, such as Stove Top©
- Boxed lard, such as Morrel©
- Instant soup mix, such as Mrs. Grass© and Williams Country Store©

How to Avoid It:

- BHA is a product-specific preservative, so check the ingredients carefully
- Eating fresh products is the best way to avoid exposure to preservatives like BHA

Alternatives

- Packaged products not listing BHA are safe alternatives
- Fresh produce, fruit, bulk food

Personal Care Products

Soap

Watch Out For:

Triclosan, fragrance (perfume)

Found In:

- Antibacterial soap, such as Dial©
- Fragranced hand soap such as Softsoap©

Alternatives:

- CleanWell© antibacterial soap, Pangea© hand soap, Dr. Bronner's© bar or liquid castile soap, alcohol-based cleaners

Where to Find It:

- All grocery and household stores

Shave Gel

Watch Out For:

- BHA, fragrance (perfume)

Found In:

- Skintimate Shave Gel©, Barbasol©

Alternatives:

- Dr. Bronner's© Magic Shaving Gel
- Avalon Organics© Moisturizing Cream Shave, Peppermint, Lavender and Aloe-unscented
- Depth© Shave Cream
- Alba© Moisturizing Cream Shave, Unscented

Where to Find It:

- Whole Foods Market
- Sunflower Market

Toothpaste

Watch Out For:

- Triclosan

Found In:

- Colgate© including Total© and many whitening varieties

Alternatives:

- Tom's of Maine©
- Other toothpaste (check the active ingredient label)

Where to Find It:

- All grocery and household stores

Lotions, Skin Moisturizers

Watch Out For:

Parabens, fragrance (perfume)

Personal Care Products continued...

Found In:

- Eucerin©, Lubriderm©, Jergens©

Alternatives:

- Whole Foods, 365 brand© (Herbal Mint, Grapefruit Citrus, Lavender scent)

Where to Find It:

- Whole Foods Market

Sunscreen

Watch Out For:

Benzophenone, oxybenzone, avobenzone, fragrance (perfume), parabens

Found In:

- Most commercial sunscreens, including Banana Boat©

Alternatives:

- California Baby© SPF 30+ Sunscreen
- Alba Botanica "Very Emollient Facial Sunblock"© SPF 30
- Alba Botanica "Very Emollient Sunblock"© SPF 30 Fragrance Free
- All Terrain© AquaSport SPF 30
- Badger© Natural and Organic Sunscreen, SPF 15, 30
- Soleo Organics© All Natural Sunscreen, SPF 30
- MyChelle Dermaceuticals© Sun Shield SPF 28 (local product)
- Kiss My Face obsessively Natural© Sunscreen, SPF 18
- Kiss My Face© Sunspray Lotion SPF 30 (carefully check all Kiss My Face© products because many contain fragrance)

Where to Find It:

- Whole Foods Market, Sunflower Market, REI and Vitamin Cottage

Diaper Rash Cream

Watch Out For:

BHA, fragrance (perfume), parabens

Found In:

- Desitin© Diaper Cream

Alternatives:

- California Baby© Diaper Rash Creme

Where to Find It:

- Whole Foods Market

Face Wash

Watch Out For:

Fragrance (perfume), parabens

Found In:

- Neutrogena© Clean & Clear©

Alternatives:

- Thoroughly Clean Face Wash©

Where to Find It:

- Golden Natural Foods and Whole Foods Market

Insect Repellent/Bug Spray

Watch Out For:

DEET

Found In:

- Most commercial bug spray/insect repellents including OFF Deep Woods©

Alternatives:

- Jason's Pure "quit bugging me"© Natural & Organic insect repellent spray
- Ecosmart© organic insect repellent

Where to Find It:

- www.jason-natural.com and Whole Foods Market

Shampoo & Conditioner

Watch Out For:

Parabens (methylparaben, ethylparaben, propylparaben), fragrance (perfume)

Found In:

- Most commercial varieties, even if they are "natural"

Alternatives:

- Sunflower Market Shampoo© (Vanilla) artificial fragrance and paraben free
- Whole Foods 365 Shampoo© (Herbal Mint, Grapefruit Citrus, Lavender) Sunflower Market
- Whole Foods 365 Conditioner© (Herbal Mint, Grapefruit Citrus, Lavender scent)

Where to Find It:

- Whole Foods Market and Sunflower Market

Cleaning Products:

Laundry Detergent

Watch Out For:

Surfactants (octylphenol, nonylphenol), fragrance (perfume)

Found In:

- Assume all commercial detergents contain surfactants unless otherwise labeled

Alternatives:

- Ecos© All Natural Laundry Detergent, coconut kernel based surfactants
- Vaska© Herbatergent Laundry Detergent Lavender scent, plant-based surfactants
- Vaska© Bleach
- Vaska© Spot Remover

Where to Find It:

- Golden Natural Foods and Whole Foods Market (Ecos©)

Dish Soap

Watch Out For:

Surfactants (octylphenol, nonylphenol)

Found In:

- Assume all commercial detergents contain surfactants unless otherwise labeled

Alternatives:

- Earth Friendly Products Ultra Dishmate© with coconut oil derived surfactants

Where to Find It:

- Golden Natural Foods and King Soopers

CEC-Free Product Lines

Pangea Organics©

- Free of parabens and artificial or synthetic fragrances
- Products include body and facial skin care
- Where to find it: Whole Foods Market (Denver), Vitamin Cottage (Denver), or www.pangeaorganics.com

Organique by Himalaya©

- Free of parabens and artificial fragrances. Products include body and facial skin care, hair care, and toothpaste
- Where to find it: Whole Foods Market

How to Get More Information

For more information about CECs and ways to minimize your chemical footprint, please contact us at the Institute for Environmental Solutions at CEC@i4es.org or our website www.i4es.org.

Resources

U.S. Department of Health and Human Services – Household Products Database:
http://householdproducts.nlm.nih.gov/index.htm

U.S. Food and Drug Administration:
www.fda.gov/NewsEvents/PublicHealthFocus/ucm064437.htm

Help Keep The Water Clean!

Sponsor or host a Workshop, Display, or Presentation on reducing exposure to contaminants in household and personal care products…. And reduce water pollution!

IES welcomes Parents, Community Groups, and Business participation. For more information, please email Info@i4es.org or call 303-388-5211.

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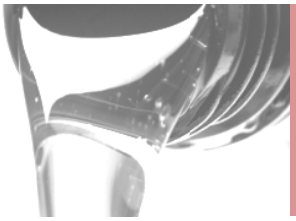

Contaminants of Emerging Concern (CECs)

Essential Oil Guide and Recipes for Contaminant-Free Beauty Products

What are Contaminants of Emerging Concern (CECs)?

As a result of everyday household use, trace amounts of chemicals from consumer products are accumulating in downstream water sources. CECs are known or suspected toxins or endocrine disruptors, meaning they interfere with the normal functioning of hormones, and may be linked to mutations and other biological abnormalities in aquatic life and human health risks. Traditional wastewater treatment does not effectively remove all CECs, allowing their release into the environment even after water has been treated. Scientists have not yet characterized what level of exposure to these suspected toxins and endocrine disruptors is harmful to humans.

CONTAMINANTS OF EMERGING CONCERN

How to Use This Guide

This guide and recipe resource is intended to help consumers avoid exposure to harmful contaminants through making informed shopping choices and making your own contaminant-free beauty products. It includes a glossary of CECs, and provides information covering the essential oils that are great for skin and hair care. The guide provides information about how to use natural oils, along with some easy recipes to make a variety of non-toxic skin and hair care products with simple ingredients. Consult this guide and recipe list to protect yourself and your family from contaminant exposure and to reduce your "chemical footprint."

Essential Oils

Essential Oils are made from volatile compounds found in plants. They give fruits, flowers, herbs and spices their fragrance and flavor. Obtained by distillation or expression (squeezing or pressing), essential oils are effective in very low concentrations. Tea tree oil, chamomile, lavender, geranium, rose, neroli and ylang ylang essential oils are recommended for all skin types because they are soothing, anti-inflammatory, healing and nutritive.

Carrier Oils

Carrier Oils are used in higher concentrations in cosmetics, or they can be applied directly to the body. They are also used as a base for essential oils. Carrier oils penetrate the skin better than creams because they penetrate cell walls instead of just sealing the skin as cream does. If you have allergies to any oils, especially nut-based oils, check with your doctor before using either carrier or essential oils.

Popular Carrier Oils

Almond Oil: A high protein, low cost oil

Avocado Oil: A great moisturizer

Apricot Kernel Oil: Makes great lip balm

Cocoa Butter: Water repellent, great for very dry skin

Grapeseed Oil: Less greasy than other oils

Sesame Oil: Has some natural sunscreen properties, light and nutty oil

Jojoba Oil ("ho-HO-ba"): A liquid wax; makes a great hair conditioner.

Olive Oil: Slow-drying and a great pre-wash hair conditioner.

Shea Butter: A great skin protectant and moisturizer

Wheat Germ Oil: High in vitamin E

Vitamin E Oil: Use on scrapes and cuts to reduce scar tissue formation and scars. Can also be used as a light sunscreen.

Personal Care Uses

Skin Care with Natural Oils

- Use as a skin moisturizer. The best time to put on oil is after a shower having lightly dried off. Oil seals in the moisture.
- Rub on cuticles. Let sit for 5 minutes, then push back and/or cut with cuticle scissors.
- Combine equal amounts of unscented natural lotion with an essential oil/carrier oil blend for a creamier lotion.
- Use as a lip treatment. Add natural almond, mint, or vanilla extract for scent and flavor.
- Eye make-up remover:
  1. Put equal parts oil and water in small container with a lid or cap (such as a small travel bottle).
  2. Shake before every use. Put a small amount on a cotton ball and use to remove eye makeup.
- Add 1/8 cup to a bath to reduce drying effects of hot water and moisturize skin.
- Rub oil, especially cocoa butter and vitamin E oils, on scars and stretch marks to help fade.
- Add a few drops of vitamin E oil to a quarter-sized amount of sunscreen. Vitamin E oil helps to protect skin from ultraviolet rays.

Hair Care with Natural Oils

- Use a couple drops to smooth frizzy and unruly hairs.
- Rub on to scalp and hair until hair is very lightly coated (usually 1 teaspoon to 1 tablespoon depending on length and thickness) and let sit for as long as you want depending on the level of moisturizing needed. Wash with shampoo and condition normally. If you want intense moisturizing, leave on overnight, but wear a knit hat to keep oil off your pillow. Wash out in the morning.
- Put a few drops on ends and dry areas of hair before blow-drying for a moisturizer.
- Depending on your hair's length and thickness, put a small amount in hair before going swimming to seal cuticle and protect from chemicals.
- Fill cosmetic spray bottle with water; add 3 drops of your favorite essential oil and 1 tbsp oil. When out in the sun, spray on hair to protect if from the sun.

Recipes

Eye Makeup Remover

Ingredients:

Carrier Oil, Water, Essential Oil

Steps:

Step 1: Combine equal parts carrier oil and water into small jar.

Step 2: Add a couple of drops of essential oil for scent.

Step 3: Shake before every use. Put an appropriate amount on a cotton ball and use to remove eye makeup.

Avocado & Mayonnaise Deep Hair Conditioner

Ingredients:

½ Avocado, Mayonnaise

Steps:

Step 1: Mash half an avocado.

Step 2: Add mayonnaise until consistence is smooth and manageable. This will depend on the size of the avocado, and personal preference.

Step 3: Use on hair following regular shampooing.

Apple Cider Vinegar Conditioner

Ingredients:

Apple cider vinegar, Warm Water, Essential Oil (optional)

Steps:

Step 1: Combine equal parts apple cider vinegar and warm water. Add a couple of drops of your favorite essential oil for scent.

Step 2: Use on hair after regular shampooing and rinse.

Body Lotion

Ingredients:

1 tablespoon grated beeswax, ¼ cup cocoa butter, ¼ cup jojoba oil or grapeseed oil, 1/8 teaspoon baking soda, ¼ cup distilled water, 1/8 teaspoon lecithin, 5 drops of essential oil (optional)

Steps:

Step 1: Combine grated beeswax and cocoa butter in microwavable container. Microwave until mixture is a smooth, liquid consistency.

Step 2: Add oil to mixture.

Step 3: Heat water until it is almost to a boil. The water must be hot so that it will not cause the cocoa butter to solidify when added. Add baking soda to the water, then combine with the cocoa butter and beeswax mixture.

Step 4: Add lecithin.

Step 5: Mix continuously for the first couple of minutes. When mixture begins cooling, screw on the lid and shake occasionally for the first hour. The lotion is ready when it has completely cooled. This will take several hours.

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Table 1. Eleven contaminants and their environmental fates in the water supply and effects on human and ecosystem health. The human health and ecological effects of these contaminants are explored more in Chapter 5. "PCPs" □ personal care products.

	Atrazine[i, ii,iii]	**Benzo-phenone**[iv,v]	**Butylated hydroxyl-anisole (BHA)** [vi,vii,viii,]	**Bisphenol A (BPA)** [ix]	**Caffeine** [x]	**Methyl-paraben**	**Musk ketone**[xi,xii, xiii]	**N-Butyl-paraben**[xiv, xv,xvi]	**Nonyl-phenol**[xvii]	**Octyl-phenol**	**Triclosan** [xviii,xix]
Application	Herbicide	UV blocker; color & scent preservative in PCPs	Food preserv-ative (anti-oxidant)	Plasticizer (*e.g.*, hard plastic H_2O bottles, epoxy can linings)	Stim-ulant	Anti-fungal preserv-ative in foods & PCPs	Fragrance in PCPs & detergents	Fragrance ingredient & preserv-ative in cosmetics	Surfact-ant in detergent & PCPs	Detergent surfactant	Anti-microbial
Environmental source				Effluents & emissions from facilities that produce epoxy, polycarbonate, and polysulfone resins[xx] and from recycling sites for thermal fax paper, sewage plants, and permitted discharges, & leaching from landfills and polycarbonate food containers.[xxi,xxii,xxiii]							
Aquatic ½-life (days)	578	1-10	37.5 (modeled)	1-4 days					0.5-20.0		~90 (est.)
Water solubility	Insoluble	Insoluble	Moderate	Moderate	High	Slight	Insoluble	Negligible	Pos. correlate d to temp & pH	Low	Limited
Photo-degradability	Resistant		After prolonged exposure	Occurs but rate unknown			Minimal	No	Yes	Yes	Yes
Biodegrad-ability	Moderate		Yes	Rapid	Potential		No	Yes	Yes	Yes	Significant
Volatility	Limited		Semi- to non-volatile	Low	No		Yes		Yes	Yes	At high temps
Bioaccum-ulation potential	Not expected		Low potential	Low	No		Yes (highly lipophilic)	Moderate	Yes	Yes	Yes (highly lipophilic)

[i] Interim Reregistration Eligibility Decision for Atrazine, U.S. EPA, January, 2003.
[ii] Environment Canada, 2 February 2009. http://www.ec.gc.ca/substances/ese/eng/challenge/batch8/batch8_25013-16-5.cfm Available 12 September 2009.
[iii] Low Henry's Law constant of 2.6×10^{-9} atm·m^3/mol; Brook trout tissue atrazine levels were undetectable after 44 weeks of exposure. Technical Fact Sheet on Atrazine, U.S. EPA, http://www.epa.gov/safewater/pdfs/factsheets/soc/tech/altrazine.pdf Available 12 September 2009.

[iv] J.T. Baker (Mallinckrodt Baker Inc.), 9 September 2009. Benzophenone MSDS. http://www.jtbaker.com/msds/englishhtml/b1488.htm Available 12 September 2009.

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Top 10 Ways to Reduce Your Chemical Footprint

More Information Inside!

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Contaminants of Emerging Concern

INSTITUTE FOR ENVIRONMENTAL SOLUTIONS

CONTAMINANTS of EMERGING CONCERN

What are Contaminants of Emerging Concern (CECs)?

A variety of contaminants entering our waterways found in trace amounts in everyday items

The Danger of CECs

Not removed by traditional wastewater treatment facilities

Persistent: They build up in the environment

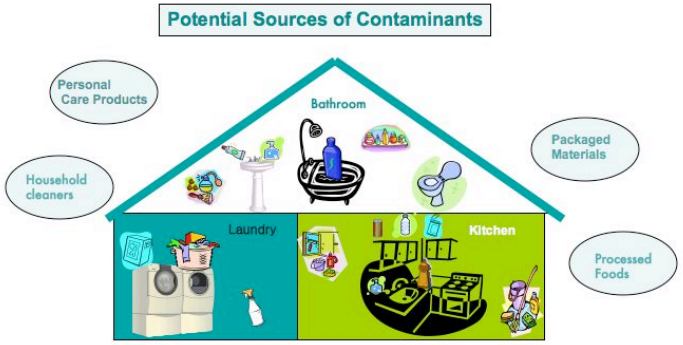
Exposure to CECs Can:

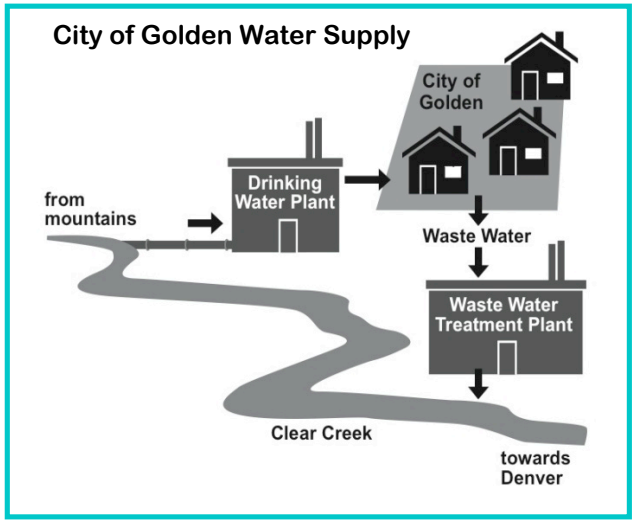
- **Disrupt Hormone Function**
  Many CECs are endocrine disruptors, interfering with hormonal function
- **Cause Deformities**
  Fish with inter-sex deformities following exposure have been reported
- **Pose Human Health Risks**
  Severity and critical amounts of exposure remain unknown

Want to Learn More?

Visit www.i4es.org

Your Chemical Footprint





The above diagram illustrates drinking water only, not stormwater. Stormwater drains directly to Clear Creek without treatment

Ten Easy Ways to Reduce Your Chemical Footprint

1. Avoid antibacterial soap! It contains the harmful chemical triclosan
2. Don't buy toothpaste that contains triclosan.
3. Avoid fragrances. "Fragrance" on an ingredient label indicates artificial fragrance.
4. Buy fresh food instead of packaged. The liner of metal cans contains bisphenol A (BPA)
5. Avoid food with preservatives - such as butylated hydroxyanisole (BHA) and methylparaben.

6. Wash your laundry with half as much detergent
7. Wear your clothes more between washings.
8. Wash your hair less often.
9. Switch to non-toxic household cleaners.
10. Only run a full dishwasher.

Contaminants of Emerging Concern:
BPA and BHA
Food Safety-Eat Fresh!

Eating fresh produce will help avoid exposure to BPA and BHA

Bisphenol A (BPA)

What is it?

A plasticizer used in hard plastic water bottles and epoxy can lining

What's the harm?

BPA is demonstrated to be an estrogen mimicker, which disrupts hormone function in the body.

Animal studies have found evidence linking BPA exposure to:

infertility
weight gain
behavioral changes
early onset puberty
prostate cancer
mammary gland cancer
Diabetes

Safe and Simple Alternatives

To Avoid BPA…

- Avoid aluminum cans and plastic packaging.

• Avoid hard plastic bottles labeled "PC" (Polycarbonate) #7, or "7," unless specified BPA-free. As a miscellaneous recycling designation, "7" doesn't always indicate BPA.

•Use and re-use glass containers or stainless steel water bottles.

•Dehydrated beans and soups are an easy alternative to canned goods.

To Avoid BHA…

• Check the ingredients of processed food for BHA, like cereals, dehydrated pasta dishes and potatoes.

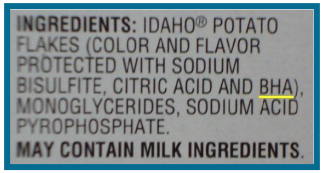
• Avoid highly processed foods, especially with preserved fats and oils.

Butylated Hydroxyanisole (BHA)

What is it?

An anti-microbial preservative added to many processed foods and cosmetics

Humans can be exposed through ingesting food.



What's the harm?

It is suspected to be:
- carcinogenic
- toxic
- an estrogen mimicker

It is a known endocrine disruptor.

It is banned from cosmetics in the European Union.

 www.i4es.org

INSTITUTE FOR ENVIRONMENTAL SOLUTIONS
scientific solutions for a better environment

Golden parents learn how close their children come in contact with harmful contaminants

by: Sarah Horn
view profile ▪ view other postings from Sarah Horn

Article Contributed on: 5/13/2010 2:10:02 PM

1

To help parents understand how to protect their young children from chemicals hidden in their food, toys, and homes, the Institute for Environmental Solutions (IES) organized a workshop last month at the Golden Community Center.

Workshop participants make hand sanitizer by mixing aloe and alcohol

Parents learned that many of these chemicals - such as bisphenol A, which is found in many plastics and the lining of canned foods - are considered Contaminants of Emerging Concern (CECs). CECs get washed down the drain and end up in the water downstream. They have been shown to interfere with the growth and development of wildlife because wastewater treatment plants do not completely remove CECs from drinking water.

These chemicals are found in products such as diaper rash cream, baby lotions, shampoos, insect repellent, sunscreen and canned baby formula. Golden residents came to the workshop because they had heard about chemical contaminants before but weren't sure how to avoid them.

"I have two small children and it's very important to me to be aware of CECs," commented Heather Schneider, a parent of two children under five years old.

There are many safe and effective alternatives to CEC-containing products, some of which can easily be made at home. IES researched and tested recipes for non-toxic alternatives to household cleaners and hand sanitizers that can contain harmful CECs such as synthetic fragrances. Participants made an all-purpose cleaner by filling a one-liter spray bottle with hot water, then added one teaspoon each of borax and vinegar or lemon juice.

When asked if she plans to use her homemade products and make the switch to safe alternatives free of CECs, Schneider said: "Yes, anything that helps my family and environment."

IES's goal is to educate the Golden community about ways they can avoid CECs. Switching to CEC-free alternatives will not only keep chemicals out of their bodies but also out of the water downstream. The next IES workshop is scheduled for May 18 at the Golden Community Center and will focus on shopping strategies for avoiding CECs at the grocery

store.

For more information, please visit www.i4es.org/emerging.html.

Guidelines: Be kind. Abusive commentary may be removed. If you believe someone has been abusive, please click "Report Abuse".

SUBMIT COMMENT
Talk Back : submit comments to the story

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Parents of Preschoolers: Child-safe Green Living / Cleaning Event April 27

by: Sarah Horn
view profile • view other postings from Sarah Horn

Article Contributed on: 4/23/2010 5:04:17 PM

Institute for Environmental Solutions Child-safe Green Living/Cleaning Workshop, April 27, Golden

The Institute for Environmental Solutions is presenting a community workshop, "Child-safe Green Living / Cleaning", in Golden this Tuesday evening, April 27. The workshop is part of the education program to demonstrate easy and effective ways people can reduce their chemical footprint.

Our April 27 workshop directed at parents of pre-schoolers is going to focus on environmentally friendly alternative cleaning and personal care products relating to children's health. We are also going to discuss the plasticizer Bisphenol A (BPA), about which the EPA announced its concern at the end of March. The EPA's announcement came after a determination about BPA in January by the FDA, who stated that it had "some concern about the potential effects of BPA on the brain, behavior, and prostate gland in fetuses, infants, and young children."

BPA can be found in non-cloudy rigid plastic containers, such as baby bottles, water bottles, kitchen utensils, toys and water cooler jugs. It is also found in the lining of metal cans, including baby formula. Children and babies show the highest level of exposure to BPA and almost 100 percent of BPA exposure is through food, according to the National Toxicology Program.

Parents of Preschoolers: Child-safe Green Living / Cleaning

Tuesday, April 27, 6:00 - 7:15 p.m.

Course 27045

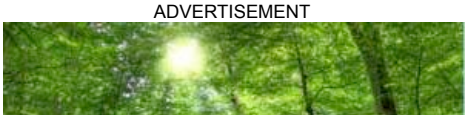
Many chemicals that appear in baby products and in cleaning products can harm your child and the environment. Learn how to make your own personal care and household cleaning products that are free of these chemicals, and find out how to avoid these chemicals in products you buy. Come to this hands-on workshop and have fun learning about how to keep your child and home free from

chemicals of concern. Participants will make and take home a safe and effective household cleaner.

Age: 13 years and older. $10 Material Fee payable directly to instructor.

All workshops will be held at the Golden Community Center in the Beaver Brook Room. Visit

https://www.goldenrec.com/golden/ or call 303-384-8100 to register or request more information.



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JEFFERSON COUNTY, COLORADO

THURSDAY, SEPTEMBER 17, 2009 ■ 50 CENTS

Golden
TRANSCRIPT

"WHERE THE WEST LIVES"

VOL. 143, ISSUE 40

INSIDE

BLACKED OUT

Golden buried by rival Wheat Ridge

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CITY COUNCIL

Erwin to run for Ward 4

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GREEN PAW

Eco-friendly pet boutique opens downtown

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SIDETRACKS

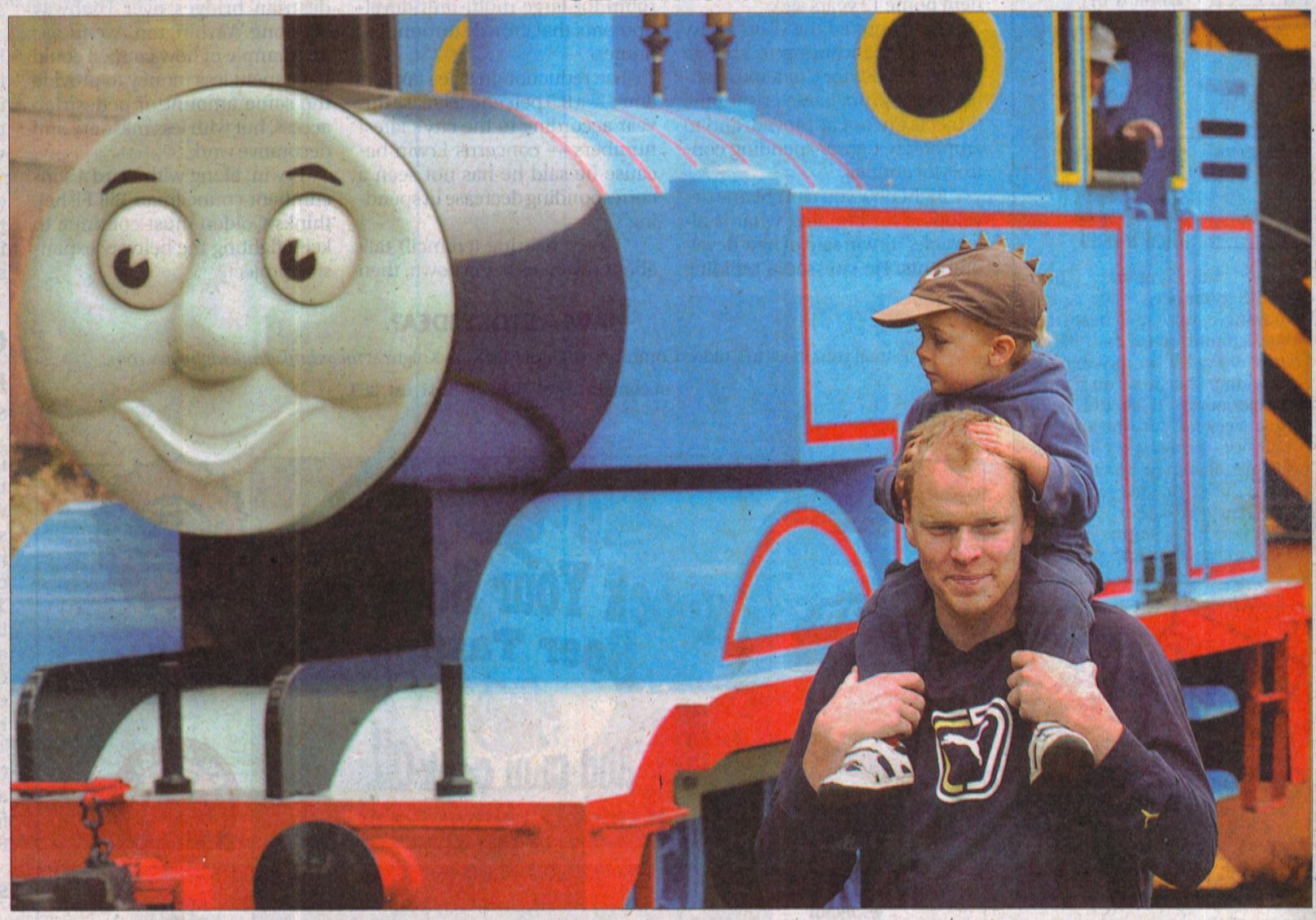

Photo by JUSTIN SAGARSEE

Andrew Johnson, 2, enjoys a ride from his father Chris while spending the afternoon at the Colorado Railroad Museum for "Day Out with Thomas" Saturday, Sept. 12. Thomas will be available for pictures and rides the next two weekends at the museum.

Water pollution prevention study set for Golden

Personal care products and household cleaners targeted

BY MEREDITH KNIGHT
meredithk@milehighnews.com

Over the next year, Golden will become a testing ground of sorts, as the Institute of Environmental Sciences works to educate citizens about wastewater contaminants, then test the city's wastewater to see if the education was productive.

The study specifically targets consumer products such as shampoo, antibacterial soaps and lotions that contain chemicals that persist in the water system after they are washed away and have unknown health effects for aquatic life, according to Project Manager Sara Klingenstein.

See WATER, Page 4

LOCAL NEWS • SPORTS • CLASSIFIEDS

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CONTAMINANTS OF EMERGING CONCERN

The Institute for Environmental Solutions will be checking levels of more than a dozen emerging contaminants before and after its educational campaign in Golden. Those chemicals include atrazine, an herbicide, triclosan, an antimicrobial agent found in antibacterial soap, bisphenol A, found in plastic water bottles, and methylparaben, an antifungal agent used to preserve foods.

For more information on the study, or to volunteer to host a block party or distribute surveys, contact the institute at *www.i4es.org* or by e-mail at *CEC@i4es.org*.

WATER FROM PAGE 1

Millions of dollars are spent on studying the toxic effects of these chemicals, but little is done to study protection, EIS director Carol Lyons said.

"To our knowledge nobody aside from ourselves is conducting a project to prevent contaminants of emerging concern from getting in the water," Lyons said

In the next few months IES hopes to have a list of recommendations people could implement to reduce their chemical footprint, or the amount of chemicals they put into the wastewater system, according to Lyons.

Musk ketone, for example, is a chemical fragrance often included in shampoos and other scented products.

"It's designed to be very persistent," Klingenstein explained, so the product's fragrance lasts. But that means the chemical does not break down in wastewater and is ingested by the tiny krill and other organisms that larger fish eat. The contamination can then be passed on to larger organisms.

Initial water samples have been taken from the city's wastewater system to establish baseline levels of the chemicals.

EIS will conduct surveys to find out about people's buying and using behaviors. The project's goal is to reach 400 to 500 households.

Then, the six-month community-based social-marketing campaign will begin.

Klingenstein said the outreach would be interactive, rather than just providing information. She envisioned "Tupperware parties without any Tupperware" where neighborhood groups would gather to learn about contaminants, how to read labels to find them in products, and what alternative products are available.

After that, water samples and consumer surveys will be taken again to see what impact the study had.

If the study proves successful, EIS will make the program available to other cities and include other emerging contaminants.

"The purpose of IES' project is to do the investigation necessary so policy makers and decision makers can make the right decision," Lyons said.

SEND US YOUR NEWS

Send information to us at: Mile High Newspapers, P.O. Box 17270, Golden, CO 80402, or e-mail it to *newsroom@milehighnews.com*. Photos may be included.

Clean Up Your Beauty Routine!

Welcome to the Golden Workshop on Contaminant-Free Beauty Care, presented by the Institute for Environmental Solutions (IES).

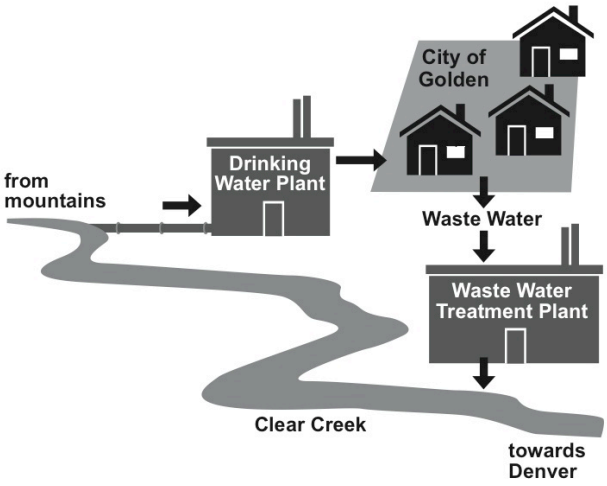
Today's workshop agenda:

1. **Discuss the Issue**: Chemicals from personal care products are appearing in rivers and streams.

   These chemicals known as "**contaminants of emerging concern**" (CECs) may disrupt hormonal systems, cause cancer, or pose other health risks. CECs are added to many everyday consumer products, such as shampoo, detergent, lotion, soap, and processed food.

2. **Hands-on**: Make your own personal care products.

3. **Question and Answer** session.



Golden's water comes from Clear Creek, and is treated at a wastewater treatment plant before being released back into Clear Creek.

For more information, or to get involved, visit www.i4es.org/emerging.html, or send an email to CEC@i4es.org.

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Thank you for attending our **Clean Up Your Beauty Routine!** *Workshop, July 13, 2010! Please take the time to answer some questions.*

1. Why did you decide to attend today's workshop?

_____
_____

2. How did you find out about today's workshop?

_____

3. What was your favorite part of today's workshop and why?

_____
_____

4. What could we improve on?

_____
_____

5. Do you plan to use the alternative products presented today?
Why or why not?

_____
_____

5. Would you like to receive IES's quarterly environmental e-newsletter? Yes / No

If yes, please provide your email address:_____

6. May we contact you to check in and with notification of future events?
Yes / No

Name: _____ Phone: _____
E:mail _____

IES does not sell, rent, exchange or give away any contact information.

More information: www.i4es.org Questions: CEC@i4es.org

PERSONAL CARE PRODUCT RECIPES

EYE MAKEUP REMOVER
Ingredients: *Carrier Oil* *Water* *Essential Oil*
Step 1: Combine equal parts carrier oil and water into small jar. Step 2: Shake before every use. Put an appropriate amount on a cotton ball and use to remove eye makeup. Step 3: Rinse with water.

AVOCADO AND MAYONNAISE DEEP HAIR CONDITIONER
Ingredients: *½ Avocado* *Mayonnaise*
Step 1: Mash half an avocado. Step 2: Add mayonnaise until consistence is smooth and manageable. This will depend on the size of the avocado, and personal preference. Step 3: Use on hair following regular shampooing.

APPLE CIDER VINEGAR HAIR CONDITIONER
Ingredients: *Apple cider vinegar* *Warm water* *Essential oil (optional)*
Step 1: Combine equal parts apple cider vinegar and warm water. Add a couple of drops of your favorite essential oil for scent. Step 2: Use on hair after regular shampooing and rinse.

CONTAMINANTS OF EMERGING CONCERN

BODY LOTION

Ingredients: *2 tablespoons grated beeswax*
½ cup cocoa butter
½ cup jojoba oil or grapeseed oil
¼ teaspoon baking soda
½ cup distilled water
¼ teaspoon lecithin
5 drops of essential oil (optional)

Ingredients can be purchased at Vitamin Cottage or any store that sells natural beauty products.

Step 1: Combine grated beeswax and cocoa butter in microwavable container. Microwave until mixture is a smooth, liquid consistency.
Step 2: Add oil to mixture.
Step 3: Heat water until it is almost to a boil then add baking soda to the water. The water must be hot so that it will not cause the cocoa butter to solidify when added. Combine with the cocoa butter and beeswax mixture.
Step 4: Add lecithin and a few drops of an essential oil (optional).
Step 5: Mix continuously for the first couple of minutes. When mixture begins cooling, screw on the lid and shake occasionally for the first hour. The lotion is ready when it has completely cooled. This will take several hours.

For more information, visit www.i4es.org

DONATE NOW

If you value this guide and the important work of the Institute for Environmental Solutions, please lend your support.

The Institute for Environmental Solutions is an independent non-profit organization that engages stakeholders to deliver technically sound solutions to complex environmental and health problems -- without unwanted side effects. We need your help to continue this important work. Your charitable contributions to IES benefit your health and your environment.

To support IES, please send donations to: IES, 761 Newport Street, Denver, CO 80220
Credit card donations are welcome at http://www.givingfirst.org/. Type in "IES" to donate now to IES. 100% of your credit card donation at GivingFirst.org goes directly to IES!

Have a Happy and Contaminant-Free Holiday Season

Who's on your list this holiday season? Think about making or buying gifts that don't unintentionally pollute water downstream! Many personal care gifts contain chemicals called "contaminants of emerging concern" (CECs) that are harmful to wildlife, even in small concentrations. Use this guide to find or make contaminant-free gifts. This season, give your friends and family the gift of clean waters!

GIFT GIVING

Find great contaminant-free products at Golden merchants. Mix and match to make your own gift baskets. Check labels for contaminants like fragrances, benzophenone, butylated hydroxyanisole (BHA), musk ketone, triclosan and n-butylparaben. These contaminants are found in cosmetics, soaps, bath and beauty products.

Artificial fragrances are either known or suspected to be carcinogens that do not readily biodegrade. A product contains artificial fragrance if fragrance or perfume is listed as an ingredient. Avoiding artificial fragrances is easy – stick to unscented products or products that use plant-based fragrances. Cosmetics can contain the preservative BHA and the UV-blocker benzophenone. These contaminants are thought to be endocrine disruptors, meaning that they disturb hormonal balances, and harm wildlife and possibly human health. Methylparaben is a preservative used in cosmetics that may also disrupt the endocrine system by acting like estrogen.

Antibacterial soaps, gels, and toothpastes may list triclosan as an ingredient. Triclosan does not make hands or teeth cleaner, and it is harmful. It can cause thyroid disorders in wildlife and produce harmful pollutants when exposed to sunlight on surface waters. Read the labels of all personal care and household products, and avoid anything that contains triclosan.

MAKE IT!

Making presents yourself is a resourceful and inexpensive way to offer beautiful and contaminant free gifts. Check out the recipes below for some easy gift ideas.

Olive Oil Moisturizer

This light, nourishing moisturizer works well for the face and neck but can be used all over the body. Grape seed, jojoba, and other light oils work as well.

- 1-3 ounces pure, extra virgin olive (or other) oil
- A few (3-5) drops of essential oil, such as lavender, neroli, or rose, for fragrance. (Essential oils can be found in the personal care section of stores that carry natural and organic products.)

Fill a clean glass container with oil then add the essential oil. Stir or turn container upside down a few times to mix.

Bath Powder

- ½ cup cornstarch
- 2 tbsp. arrowroot powder
- 2 tsp. baking soda
- A few drops of essential oil

Mix all ingredients well, and let stand three days. Sift through a flour sifter, and put into a powder shaker.

Lip Balm

- ¼ cup sweet almond oil
- ¼ ounce beeswax (Beeswax can be found in stores that sell candle and soap making supplies.)
- A few drops of essential oil

Pour ¼ cup almond oil into a larger measuring cup and heat in a saucepan of warm water. Slowly add beeswax and wait for it to completely melt. Use an old metal spoon to blend. Add in five drops of essential oil at a time.

To test mix: Remove spoon, leaving a bit of the oil and wax mix on the spoon. Put in the refrigerator to cool, then use your finger to test consistency. Add oil or wax as needed. When mixture is just right, spoon into jars and let cool.

Naturally Scented Moisturizer

Add natural essential oils to unscented moisturizer in reused glass containers to create a personalized and contaminant-free holiday gift.

- 4 ounces unscented moisturizer
- 15 drops essential oils

Pick a blend:

- 8 drops orange oil and 7 drops rose oil
- 8 drops grapefruit oil and 7 drops clove oil
- 9 drops lemon oil and 6 drops oregano oil

Clean House, Clean Water

When picking up a scrubber and heading into the abyss of a dirty bathroom, you want to have the best supplies – a cleaner that cleans, kills germs, and smells good. But what if that cleaner ended up back in your drinking water?

According to the Institute for Environmental Solutions, many chemicals found in everyday cleaning products are not removed by water treatment and are found in drinking water. These chemicals, known as "Contaminants of Emerging Concern," are toxic to fish and wildlife.

Making one positive change when cleaning can help reduce water pollution. Try one or more of the following ideas, and do your part to keep water clean.

Use Less

- Wash your laundry with one-third less detergent than you use now – your clothes will be just as clean. Products will last longer and save you money, while improving water quality.
- Soak clothes in the washer before starting the cycle to dilute dirt and use less detergent.

Switch to non-toxic cleaners

- Use non-toxic cleaners such as vinegar and baking soda. They are just as effective as more expensive cleaning products.
- If you use a housecleaning service, talk to your housecleaner about using non-toxic cleaners or switch to a non-toxic service.

Homemade Cleaners

- For an effective all-purpose cleaner, fill a spray bottle with hot water. Add one teaspoon of borax and one teaspoon of white vinegar or lemon juice to cut grease. Add essential oils, such as grapefruit, for scent if desired.
- Spray the shower with a mixture of three tablespoons white vinegar, one teaspoon borax and two cups hot water after each use to keep dirt from building up.

2010 Tree Sale

For nearly two decades, the City of Golden has offered residents an opportunity to buy small trees at cost. The City wanted to encourage residents to plant trees and thought the best way to accomplish that was to make it practical to both purchase and handle them. This year, the tradition continues.

The 2010 sale will offer a diverse mix of 10 deciduous trees and four conifers. The small deciduous trees will have trunk diameters of approximately 1¼ inches and range in height from four to eight feet. The conifers are three to four feet tall. Ornamental deciduous selections include: Tatarian maple, Ohio buckeye, Cleveland pear, Ruby Red horsechestnut and Turkish filbert. Shade deciduous include: Catalpa, Hackberry, Red oak, White oak and Kentucky coffeetree. Conifer selections include: Scots pine, Vanderwolf's limber pine, Austrian pine and Bosnian pine. The cost for a deciduous tree is $45 each and the conifers will be priced around $50.

Quantities are limited and orders will only be accepted for five trees or less. Orders will be taken beginning March 1 through April 5, either on the City of Golden website www.cityofgolden.net or at the front desk of the Golden Community Center, 1470 10th St. The sale is restricted to City of Golden residents, who must show proof of residency.

Trees will be distributed during the last two weeks of April. Please contact City Forester Dave High for details at 303-384-8141 or dhigh@cityofgolden.net.

Young Artist Competition Winner to Play with Jefferson Symphony Orchestra

Brandon Garbot is the first place winner in The Jefferson Symphony Young Artists Competition. The youngest finalist in this year's competition, Garbot is a 16-year old sophomore at South Ridge High School in Portland, Oregon. He performed Max Bruch's *Violin Concerto No. 1*. Garbot will be performing solo and with the 90-member Jefferson Symphony Orchestra (JSO) at their March 28 concert.

The Jefferson Symphony Young Artists Competition is a 51-year tradition. This event attracts young musicians locally and from around the world. 12 finalists were selected for the live competition which was held Jan. 9, and the three finalists performed a recital for the public. The first place finalist receives a $2,000 cash prize, a $5,000 scholarship and the opportunity to play with the Symphony. The competition alternates yearly between piano and all other orchestral instruments.

The Young Artist Concert is Sunday, March 28th, at the Green Center, 924 16th St. at 3 p.m. In addition to Garbot's solo, the Symphony will be performing *Enesco Rumanian Rhapsody no.1 op.11 in A minor* and *Beethoven Symphony no.3 in Eb Major*.

For more information, to buy tickets, to make a donation, or receive an application for next year's competition call 303-278-4237 or visit the JSO website at www.jeffersonsymphonyorchestra.org.

First place winner Brandon Garbot plays the violin.

Pack Your Pantry With Chemical Free Food and Do Your Part For The Environment

That two-year-old can of chili in your pantry is still safe to eat, according to the manufacturer. To ensure that food lasts so long it must be protected from bacteria, sunlight and air. This is done using chemicals, some of which are Contaminants of Emerging Concern (CECs). Other CECs are found in plastic and cardboard food containers, such as jars of mustard and boxes of breakfast cereal. By eating less processed and packaged foods you can lower your exposure to these contaminants.

Many CECs enter the water supply through our toilets and drains. These additives are detectable in our water even after it has been treated and sent downstream, many accumulating in the environment and possibly in humans. Avoiding CECs can be as simple as checking food labels and changing some of your shopping habits:

- Buy fruits and vegetables when they are in season as much as possible. Use frozen vegetables rather than canned. To save time, cook a little extra and freeze it for another day.
- Read labels. Avoid products which contain butylated hydroxyanisole (BHA) and methylparabens, which can disrupt hormone balances.
- Use your Golden tap water for drinking and cooking, and avoid bottled water. Fill a reusable steel bottle for drinking water on-the-go. Some water bottles and the linings of metal cans contain bisphenol A (BPA). The FDA has expressed concern about "the potential effects of BPA on the brain, behavior, and prostate gland of fetuses, infants, and children."
- Buy non-perishable food such as beans, pastas, and soup mixes in bulk. They are safer, cheaper and easy to prepare.

Reducing the synthetic chemicals that we ingest has the added benefit of reducing water pollution and protecting wildlife. A smaller "chemical footprint" means protecting your health, protecting the environment and saving money.

Protect Yourself from Theft

The City of Golden has recently experienced a high number of car break-ins, known to police as the crime of first-degree criminal trespass. While not all of these types of crimes can be prevented, there are ways to reduce your risk of being a victim.

FACTS:

- In 2009 137 vehicles were reported broken into. That means one in 124 citizens was the victim of a car break-in during the year.
- The average cost of a broken car window is $400. Insurance deductibles are often higher than that, which means unexpected out of pocket expenses.
- Victims of car break-ins often become victims of identity theft. Criminals use items stolen from vehicles to victimize all over again.

TIPS:

- ALWAYS lock your car. Most often, cars are targeted because they are left unlocked making for easy access.
- Try to park in well lit and well traveled areas.
- Don't leave anything of value in the car.
- If you must leave valuables in your vehicle, make efforts to hide items from plain view.
- Do not leave portable garage door openers in plain view. Your garage door opener combined with personal information from your vehicle can make you a victim of a home burglary, as well. Whether or not your garage door opener has been taken during the break-in, change your door codes as soon as possible.
- Examples of items sought by criminals: IPODS, stereo faceplates, GPS units, purses, wallets or backpacks, sporting equipment, laptops, credit cards, checkbooks, identification, cell phones, even spare change and cigarettes.

The Golden Police Department does not want you to be the victim of this type of crime. Please help us help you. Together we can significantly decrease the prevalence of these crimes in Golden.

Please report suspicious activity - 303-384-8045.

Anonymous Crime Tip Hotline - 303-384-8034.

Save Money and Reduce Your Chemical Footprint

Washing clothes and dishes has come a long way since the days of toiling over a wash basin and using bars of soap. But, modern washers call for modernized washing habits and in general, use a lot less soap or detergent.

Conserving detergent means less is going down the drain and into the environment while clothes and dishes are just as clean. Many detergents contain fragrances and chemicals called surfactants, which, over long periods of time, can be harmful to fish and other aquatic wildlife. New technology and new manufacturing processes mean that dishwashing and laundry detergents are much more effective and concentrated than they have ever been. In other words, less is more!

When too much laundry detergent is used, it stays on clothing and skin. Using only the amount needed can help reduce skin irritation and environmental contamination. At the same time, we can all save money and reduce waste. Reducing our chemical footprint, saving money, preventing water pollution, and keeping clean are easy!

Laundry: Try using one-third of the amount of detergent and fabric softener for two weeks. At the end of two weeks, run your washer with two rinse cycles. During the second rinse, check the rinse water. Is the water soapy and sudsy? If so, reduce the amount used again for another two weeks and test. The goal is to have rinse water with minimal suds.

Dishwasher: Try using one-third of the amount of dishwasher soap for two weeks. Check the water during the final rinse cycle. If it's still soapy or sudsy, reduce again.

All household products: Watch labels for the ingredients that include fragrance and triclosan. Try to avoid these harmful ingredients.

Expanded Internet at Golden Library

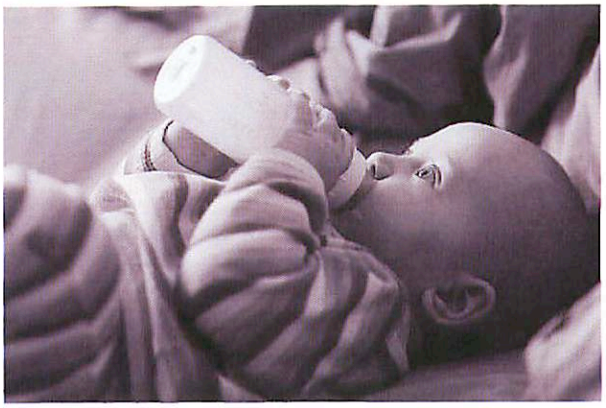
Golden library patrons can now access enhanced high-speed wireless networks. The expanded wireless Internet access is an effort by the Jefferson County Public Library (JCPL) to meet the needs of library users throughout the county. According to the JCPL, in 2009, patrons accessed online library resources more than 3.9 million times, up from only 215,000 in 1999.

Patrons with Wi-Fi enabled laptops may access the new wireless system by connecting to the "JCPL-Public" network. No special password, user names or settings are required to gain access to the Internet; however, users must agree to abide by the Library's Internet and Safety Policy. Golden is one of eight Jefferson County libraries to receive the upgrade.

Other new high-tech offerings include Playaways (portable audio books), downloadable eBooks and downloadable audio books. For more information on these and other JCPL offerings, visit the Golden Library, 1019 10th Street or visit www.jeffcolibrary.org.

BPA-proof Your Home

Children and babies show the highest level of exposure to Bisphenol A (BPA), a chemical used to make plastics for packaging materials and containers for food and drinks. The U.S. Environmental Protection Agency and the Food and Drug Administration (FDA) announced concerns over the health effects of BPA this year. The FDA, which regulates BPA in food and drink packaging, said it has "some concern about the potential effects of BPA on the brain, behavior, and prostate gland in fetuses, infants, and young children."



Almost 100 percent of BPA exposure is through food consumption, according to the U.S. National Toxicology Program. Parents can easily protect their children by knowing what products most likely contain BPA and keep them away from children.

Avoid: Hard plastic kitchen tools, such as spatulas, ladles and colanders because they come into contact with heat and food and may contain BPA. Heat can cause BPA to leach out.

Switch to: Wood, metal or glass stirring spoons, spatulas, measuring cups and measuring spoons.

Avoid: Water from five-gallon commercial jugs. The rigid plastic could contain BPA.

Switch to: Golden tap water – it is clean and pure.

Avoid: Plastic baby bottles, unless they are labeled "BPA-free."

Switch to: Glass baby bottles.

Avoid: Plastic sippy cups, unless they are labeled "BPA-free."

Switch to: Stainless steel. Look for stainless steel bottles that do not have a plastic liner.

Avoid: Plastic toys for toddlers. Chewing can break down plastic and release BPA.

Switch to: Fabric or wood toys.

Avoid: Canned infant formula. BPA is used to line metal cans.

Switch to: Powdered formula, which may not have BPA in the packaging. If you prefer liquid formula, buy formula packaged in paper cartons or glass containers.

Avoid: Plastic water bottles. Rigid plastic water bottles may contain BPA unless they are labeled "BPA-free."

Switch to: Stainless steel water bottles. Again, purchase stainless steel bottles without plastic liners.

GOLDEN SUSTAINABILITY
PROTECT | PRESERVE | PROSPER

Winning Sustainability Efforts

The second annual Sustainability Awards were handed out on Earth Day to six outstanding nominees. The awards recognize individuals and organizations that embody sustainability best practices and contribute toward achieving the City's ten-year sustainability goals. Each year, the City of Golden and the Community Sustainability Advisory Board (CSAB) present awards in four categories: Student, Individual, Business, and Community Group.

The 2010 Sustainability Award winners receive their awards from Mayor Jacob Smith on Earth Day.

STUDENT AWARD - ROBBIE

1st grader Robbie started his business, *Sand Shark*, in 2009 to raise money to help feed children in Colorado through selling reusable cloth napkins made in Golden. To date, Robbie raised enough funds to provide lunches to over 250 children. He has also partnered with Food Bank of the Rockies to raise awareness. His *Feeding Frenzie* napkins are reusable and help prevent waste.

INDIVIDUAL AWARDS - THE FAMILY OF LLOYD ATHEARN AND POVY ATCHISON, AND THEIR SON FORREST

These East Street neighborhood residents demonstrate how families can successfully live sustainably in Golden. Their sustainable lifestyle includes a 4.2 kW solar system for a home-based business, water conserving dual-flush toilets, low-flow fixtures and energy-efficient appliances. They're dedicated recyclers, xeric gardeners, back-yard composters, and they are long-time users of mass transit, proving that Golden is very walkable through their daily commute to work and day care.

BUSINESS AWARD - ABC CAR WASH

Jim Beetham's car wash at 730 Heritage Road, conserves water through on-site reclamation, prevents waste water pollution from entering Golden's rivers, uses biodegradable chemistry, and conserves energy through efficient lighting. In addition, ABC was recognized by the Western Carwash Association as "most innovative" for its efforts.

BUSINESS AWARD - GOLDEN REAL ESTATE

Jim Smith has invested in making his building at 17695 S. Golden Road more energy efficient through a 5.2 kW solar photovoltaic system. In addition, three solar tubes eliminate the need for interior lighting on most days, he has LED light fixtures and CFLs, a public drop-off site for polystyrene (Styrofoam) recycling, and free re-used moving boxes and a moving truck for his clients' use. Jim is also participating in a study to design a small wind turbine for his building.

BUSINESS AWARD - WOODY'S WOOD-FIRED PIZZA

Jon Bortles works to make the family business at 1305 Washington Ave. more sustainable while also benefiting his bottom line. Woody's has a 9.84 kW solar photovoltaic system, automated energy monitoring, high-efficiency appliances and lights, water-conserving fixtures and a rigorous recycling program, just to name a few.

COMMUNITY GROUP AWARD - INSTITUTE FOR ENVIRONMENTAL SOLUTIONS (IES)

Carol Lyons, executive director of IES, spearheads this pilot project effort to measure Contaminants of Emerging Concern. IES's goal is to use education to mitigate and prevent the introduction of household and personal care contamination to the downstream water supply. For more than a year, IES has worked with Golden utilities, manufacturers, researchers, and residents to evaluate contaminants and implement effective communication strategies to reduce impacts. IES's outreach to the Golden public and stakeholders has provided a valuable service to the Golden community.

It's Not Too Late To Make Healthier Choices This Summer

Use Contaminant-Free Water Bottles and Sunscreens

Summer is the time to be outdoors and enjoy the sun! Make sure you are choosing sunscreens and water bottles that don't contain contaminants that could harm your health and downstream wildlife. Contaminants of Emerging Concern (CECs) have been detected in the environment, our bodies and drinking water. Many are in products that we use every day, such as hand soap and detergents, so by choosing non-toxic products we can protect the environment and water downstream.

SUNSCREENS

Avoid sunscreen that contains benzophenone and oxybenzone. They are harmful because they disrupt hormonal balances in wildlife. Avoiding exposure to these contaminants is easy – they are listed on the labels!

WATER BOTTLES

Hard plastic bottles and the liners of aluminum bottles may contain bisphenol A (BPA). BPA can leach into the water and is harmful because it mimics estrogen and causes disruption in hormonal balances. The Food and Drug Administration expressed concern over "the potential effects of BPA on the brain, behavior, and prostate gland of fetuses, infants and children."

If you buy plastic bottles, buy only plastic bottles without a #7 on the bottom unless the label says it is BPA-free. Stainless steel bottles (such as those from Klean Kanteen and Poison Bottle Company) are BPA-free. Avoid aluminum, which frequently contains BPA lining, unless it is labeled BPA-free.

For more information, visit the Institute for Environmental Solutions at www.chemicalfootprint.org.

FINE ARTS FESTIVAL

Come browse a variety of beautiful art at the 20th annual Golden Fine Arts Festival, from 10 a.m. to 5 p.m. Saturday, Aug. 21 and Sunday, Aug. 22, 2010, on 11th Street just west of Washington Avenue in historic downtown Golden.

The juried festival is an open-air art gallery in a gorgeous foothills setting adjacent to Clear Creek. The Golden Fine Arts Festival is well-known for its quality, affordability, ambiance and proximity to the metro area. Hosting 140 high-quality artists, 80 percent of whom are Coloradan and many from as far away as both U.S. coasts, the Festival features a variety of artwork, including ceramic arts, fiber arts, glass, jewelry, mixed media, painting, photography and sculpture.

The Festival is free and includes free horse-drawn carriage rides through historic downtown Golden, free live musical entertainment, artists' demonstrations, and a special hands-on Kids Art Zone operated by ArtReach that is always a hit with younger art patrons. In addition, other coinciding art-filled events and activities are offered throughout the weekend at galleries and merchants in downtown Golden, just a block from the Festival. Golden's Clear Creek History Park, located alongside the Fine Arts Festival will be free throughout the weekend with blacksmith and pioneer cooking demonstrations.

Prizes will be awarded to artists in eight categories and cash awards total more than $1,800.

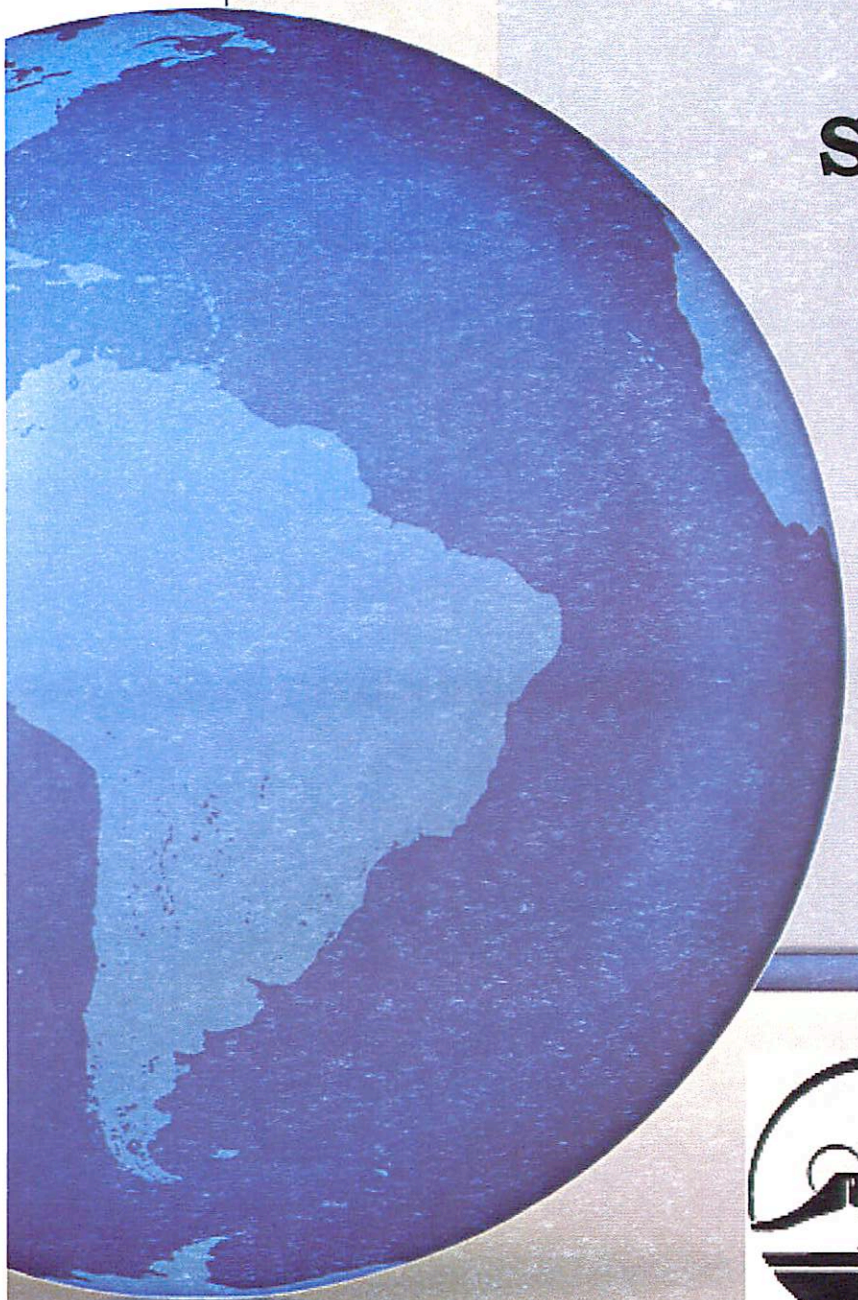
For more information about the Golden Fine Arts Festival visit www.GoldenFineArtsFestival.org. The event is put on by the Golden Chamber of Commerce.

INSTITUTE FOR ENVIRONMENTAL SOLUTIONS
Chemical Analysis of Wastewater Samples

9/2/09

Compound	**Category**
Atrazine	Herbicide
Benzophenone	UV-blocker; preserves colors and scents in personal care products
Butylated hydroxyanisole (BHA)	Food preservative
BPA (bisphenol A)	Plasticizer; in hard plastic water bottles, epoxy can linings, …
Caffeine	Stimulant
Cotinine	Metabolite of nicotine
DEET	Insect repellant
Methylparaben	antifungal used as preservative in foods and PCPs
Musk ketone	Artificial fragrance; in lotions, soaps, perfumes, detergents; …
N-Butylparaben	in cosmetics as a fragrance ingredient, preservative, and "masking"… www.cosmeticsdatabase.com/ingredient.php?ingred06=700868&nothanks=1
Nonylphenol	Surfactant in detergent, personal care products, …
Octylphenol	Surfactant in detergent
Triclosan	Antimicrobial agent; in antibacterial hand soap, toothpaste, toys, …
~~Tris (1-chloro-2-propyl) phosphate (TCPP)~~	~~Flame retardant~~
~~Tris (1-chloro-2-propyl) phosphate (TCPP)~~	~~Flame retardant~~

Carol E. Lyons
Carol@i4es.org



2010 City of Golden Sustainability Award – Community Group

THIS CERTIFICATE IS AWARDED TO

INSTITUTE FOR ENVIRONMENTAL SOLUTIONS

IN RECOGNITION OF YOUR CONTRIBUTION TO THE CITY OF GOLDEN SUSTAINABILITY EFFORTS

MAYOR, CITY OF GOLDEN

IES-CEC Wastewater Sample Analysis, City of Golden, CO (May 11, 2010)

Data Source: U.S. Environmental Protection Agency-Region 8-Technical and Management Services

Location	**Lab Tap**	DRINKING WATER
Sample Date	**5/11/2010**	
Sample Time	**9:30**	
Preservative (yes/no)	no	
EPA Lab ID	1005005-02 A	

LCMS ANALYSIS

	Units	Report Limit	Dilution factor	Analysis date	Flow rate	Results
Atrazine	ng/L	10	1	7/30/2010		< 10.0
Caffeine	ng/L	25	1	7/30/2010		< 25.0
Cotinine	ng/L	10	1	7/30/2010		< 10.0
DEET	ng/L	25	1	7/30/2010		< 25.0
Methylparaben	ng/L	25	1	8/8/2010		45.6
N-Butylparaben	ng/L	10	1	8/8/2010		< 10.0
Triclosan	ng/L	10	1	8/8/2010		67.2

GCMS ANALYSIS

	Units	Report Limit	Dilution factor	Analysis date	Flow rate	Results
Benzophenone	ug/L	0.188	1	8/7/2010		0.275
Butylated hydroxyanisole (BHA)	ug/L	0.188	1	8/7/2010		< 0.188
BPA (bisphenol A)	ug/L	0.188	1	8/7/2010		< 0.188
Caffeine	ug/L	0.312	1	8/7/2010		< 0.312
Nonylphenol	ug/L	0.188	1	8/7/2010		< 0.188
4-n-Octylphenol	ug/L	0.125	1	8/7/2010		< 0.125
4-tert-Octylphenol	ug/L	0.188	1	8/7/2010		< 0.188
Triclosan	ug/L	0.188	1	8/7/2010		< 0.188

Note: Triclosan and caffeine were analyzed by BOTH methods.

Location	**Lab Tap**	DRINKING WATER
Sample Date	**5/11/2010**	
Sample Time	**11:38**	
Preservative (yes/no)	no	
EPA Lab ID	1005005-04 A	

LCMS ANALYSIS

	Units	Report Limit	Dilution factor	Analysis date	Flow rate	Results
Atrazine	ng/L	10	1	7/30/2010		< 10.0
Caffeine	ng/L	25	1	7/30/2010		28.8
Cotinine	ng/L	10	1	7/30/2010		< 10.0
DEET	ng/L	25	1	7/30/2010		< 25.0
Methylparaben	ng/L	25	1	8/8/2010		81.8
N-Butylparaben	ng/L	10	1	8/8/2010		< 10.0
Triclosan	ng/L	10	1	8/8/2010		58.5

GCMS ANALYSIS

	Units	Report Limit	Dilution factor	Analysis date	Flow rate	Results
Benzophenone	ug/L	0.188	1	8/7/2010		< 0.188
Butylated hydroxyanisole (BHA)	ug/L	0.188	1	8/7/2010		< 0.188
BPA (bisphenol A)	ug/L	0.188	1	8/7/2010		< 0.188
Caffeine	ug/L	0.312	1	8/7/2010		< 0.312
Nonylphenol	ug/L	0.188	1	8/7/2010		< 0.188
4-n-Octylphenol	ug/L	0.125	1	8/7/2010		< 0.125
4-tert-Octylphenol	ug/L	0.188	1	8/7/2010		< 0.188
Triclosan	ug/L	0.188	1	8/7/2010		< 0.188

Note: Triclosan and caffeine were analyzed by BOTH methods.

Location **Lab Tap** DRINKING WATER
Sample Date **5/11/2010**
Sample Time **14:02**
Preservative (yes/no) no
EPA Lab ID 1005005-07 A

LCMS ANALYSIS

	Units	Report Limit	Dilution factor	Analysis date	Flow rate	Results
Atrazine	ng/L	10	1	7/30/2010		< 10.0
Caffeine	ng/L	25	1	7/30/2010		< 25.0
Cotinine	ng/L	10	1	7/30/2010		< 10.0
DEET	ng/L	25	1	7/30/2010		< 25.0
Methylparaben	ng/L	25	1	8/8/2010		< 25.0
N-Butylparaben	ng/L	10	1	8/8/2010		< 10.0
Triclosan	ng/L	10	1	8/8/2010		< 10.0

GCMS ANALYSIS	Units	Report Limit	Dilution factor	Analysis date	Flow rate	Results
Benzophenone	ug/L	0.188	1	8/7/2010		0.262
Butylated hydroxyanisole (BHA)	ug/L	0.188	1	8/7/2010		< 0.188
BPA (bisphenol A)	ug/L	0.188	1	8/7/2010		< 0.188
Caffeine	ug/L	0.312	1	8/7/2010		< 0.312
Nonylphenol	ug/L	0.188	1	8/7/2010		< 0.188
4-n-Octylphenol	ug/L	0.125	1	8/7/2010		< 0.125
4-tert-Octylphenol	ug/L	0.188	1	8/7/2010		< 0.188
Triclosan	ug/L	0.188	1	8/7/2010		< 0.188

Note: Triclosan and caffeine were analyzed by BOTH methods.

Location	**Lab Tap**	DRINKING WATER
Sample Date	**5/11/2010**	
Sample Time	**16:10**	
Preservative (yes/no)	no	
EPA Lab ID	1005005-09 A	

LCMS ANALYSIS

	Units	Report Limit	Dilution factor	Analysis date	Flow rate	Results
Atrazine	ng/L	10	1	7/30/2010		< 10.0
Caffeine	ng/L	25	1	7/30/2010		42.7
Cotinine	ng/L	10	1	7/30/2010		< 10.0
DEET	ng/L	25	1	7/30/2010		< 25.0
Methylparaben	ng/L	25	1	8/8/2010		< 25.0
N-Butylparaben	ng/L	10	1	8/8/2010		< 10.0
Triclosan	ng/L	10	1	8/8/2010		< 10.0

GCMS ANALYSIS	Units	Report Limit	Dilution factor	Analysis date	Flow rate	Results
Benzophenone	ug/L	0.150	1	8/7/2010		0.230
Butylated hydroxyanisole (BHA)	ug/L	0.150	1	8/7/2010		< 0.150
BPA (bisphenol A)	ug/L	0.150	1	8/7/2010		< 0.150
Caffeine	ug/L	0.250	25	8/7/2010		< 0.250
Nonylphenol	ug/L	0.150	1	8/7/2010		< 0.150
4-n-Octylphenol	ug/L	0.100	1	8/7/2010		< 0.100
4-tert-Octylphenol	ug/L	0.150	1	8/7/2010		< 0.150
Triclosan	ug/L	0.150	1	8/7/2010		< 0.150

Note: Triclosan and caffeine were analyzed by BOTH methods.

IES-CEC Wastewater Sample Analysis, City of Golden, CO (May 11, 2010)

Data Source: U.S. Environmental Protection Agency-Region 8-Technical and Management Services

Location	**Meter Station**
Sample Date	**5/11/2010**
Sample Time	**9:20**
Preservative (yes/no)	no
EPA Lab ID	1005005-01 A

LCMS ANALYSIS

	Units	Report Limit	Dilution factor	Analysis date	Flow rate	Results
Atrazine	ng/L	10	1	7/30/2010	1.959 mgd	< 10.0
Caffeine	ng/L	1250	50	8/5/2010	1.959 mgd	180000.0
Cotinine	ng/L	500	50	8/5/2010	1.959 mgd	2240.0
DEET	ng/L	25	1	7/30/2010	1.959 mgd	893.0
Methylparaben	ng/L	25	1	8/8/2010	1.959 mgd	341.0
N-Butylparaben	ng/L	10	1	8/8/2010	1.959 mgd	94.3
Triclosan	ng/L	250	25	8/8/2010	1.959 mgd	3280.0

GCMS ANALYSIS

	Units	Report Limit	Dilution factor	Analysis date	Flow rate	Results
Benzophenone	ug/L	0.750	1	8/7/2010	1.959 mgd	1.700
Butylated hydroxyanisole (BHA)	ug/L	0.750	1	8/7/2010	1.959 mgd	4.050
BPA (bisphenol A)	ug/L	0.750	1	8/7/2010	1.959 mgd	27.600
Caffeine	ug/L	1.250	1	8/7/2010	1.959 mgd	120.000
Nonylphenol	ug/L	0.750	1	8/7/2010	1.959 mgd	< 0.750
4-n-Octylphenol	ug/L	0.500	1	8/7/2010	1.959 mgd	< 0.500
4-tert-Octylphenol	ug/L	0.750	1	8/7/2010	1.959 mgd	4.350
Triclosan	ug/L	0.750	1	8/7/2010	1.959 mgd	12.100

Note: Triclosan and caffeine were analyzed by BOTH methods.

Location	**Meter Station**
Sample Date	**5/11/2010**
Sample Time	**11:29**
Preservative (yes/no)	no

EPA Lab ID 1005005-03 A

LCMS ANALYSIS

	Units	Report Limit	Dilution factor	Analysis date	Flow rate	Results
Atrazine	ng/L	10	1	7/30/2010	1.959 mgd	< 10.0
Caffeine	ng/L	1250	50	8/5/2010	1.959 mgd	128000.0
Cotinine	ng/L	500	50	8/5/2010	1.959 mgd	2350.0
DEET	ng/L	25	1	7/30/2010	1.959 mgd	271.0
Methylparaben	ng/L	25	1	8/8/2010	1.959 mgd	575.0
N-Butylparaben	ng/L	10	1	8/8/2010	1.959 mgd	152.0
Triclosan	ng/L	250	25	8/8/2010	1.959 mgd	2300.0

GCMS ANALYSIS

	Units	Report Limit	Dilution factor	Analysis date	Flow rate	Results
Benzophenone	ug/L	0.750	1	8/7/2010	1.959 mgd	2.350
BHA	ug/L	0.750	1	8/7/2010	1.959 mgd	1.250
BPA (bisphenol A)	ug/L	0.750	1	8/7/2010	1.959 mgd	23.000
Caffeine	ug/L	1.250	1	8/7/2010	1.959 mgd	115.000
Nonylphenol	ug/L	0.750	1	8/7/2010	1.959 mgd	9.800
4-n-Octylphenol	ug/L	0.500	1	8/7/2010	1.959 mgd	< 0.500
4-tert-Octylphenol	ug/L	0.750	1	8/7/2010	1.959 mgd	1.850
Triclosan	ug/L	0.750	1	8/7/2010	1.959 mgd	13.800

Note: Triclosan and caffeine were analyzed by BOTH methods.

Location **Meter Station**
Sample Date **5/11/2010**
Sample Time **13:42**
Preservative (yes/no) no
EPA Lab ID 1005005-05 A

LCMS ANALYSIS

	Units	Report Limit	Dilution factor	Analysis date	Flow rate	Results
Atrazine	ng/L	10	1	7/30/2010	1.959 mgd	10.1

Caffeine	ng/L	1250	50	8/5/2010	1.959 mgd	228000.0
Cotinine	ng/L	500	50	8/5/2010	1.959 mgd	2130.0
DEET	ng/L	25	1	7/30/2010	1.959 mgd	< 25.0
Methylparaben	ng/L	625	25	8/8/2010	1.959 mgd	280.0
N-Butylparaben	ng/L	10	1	8/8/2010	1.959 mgd	25.8
Triclosan	ng/L	250	25	8/8/2010	1.959 mgd	2580.0

GCMS ANALYSIS

	Units	**Report Limit**	**Dilution factor**	**Analysis date**	**Flow rate**	Results
Benzophenone	ug/L	0.750	1	8/7/2010	1.959 mgd	1.750
Butylated hydroxyanisole (BHA)	ug/L	0.750	1	8/7/2010	1.959 mgd	4.750
BPA (bisphenol A)	ug/L	0.750	1	8/7/2010	1.959 mgd	19.300
Caffeine	ug/L	1.250	1	8/7/2010	1.959 mgd	89.200
Nonylphenol	ug/L	0.750	1	8/7/2010	1.959 mgd	7.100
4-n-Octylphenol	ug/L	0.500	1	8/7/2010	1.959 mgd	< 0.500
4-tert-Octylphenol	ug/L	0.750	1	8/7/2010	1.959 mgd	6.700
Triclosan	ug/L	0.750	1	8/7/2010	1.959 mgd	9.400

Note: Triclosan and caffeine were analyzed by BOTH methods.

Location	**Meter Station FB****
Sample Date	**5/11/2010**
Sample Time	**13:47**
Preservative (yes/no)	no
EPA Lab ID	1005005-06 A

LCMS ANALYSIS

	Units	**Report Limit**	**Dilution factor**	**Analysis date**	**Flow rate**	Results
Atrazine	ng/L	10	1	7/30/2010	1.959 mgd	< 10.0
Caffeine	ng/L	25	1	7/30/2010	1.959 mgd	< 25.0
Cotinine	ng/L	10	1	7/30/2010	1.959 mgd	< 10.0
DEET	ng/L	25	1	7/30/2010	1.959 mgd	< 25.0
Methylparaben	ng/L	25	1	8/8/2010	1.959 mgd	< 25.0
N-Butylparaben	ng/L	10	1	8/8/2010	1.959 mgd	< 10.0
Triclosan	ng/L	10	1	8/8/2010	1.959 mgd	64.0

GCMS ANALYSIS

	Units	**Report Limit**	**Dilution factor**	**Analysis date**	**Flow rate**	Results

Benzophenone	ug/L	0.750	1	8/8/2010	1.959 mgd	< 0.750
BHA	ug/L	0.750	1	8/8/2010	1.959 mgd	< 0.750
BPA (bisphenol A)	ug/L	0.750	1	8/8/2010	1.959 mgd	< 0.750
Caffeine	ug/L	1.250	1	8/8/2010	1.959 mgd	< 1.250
Nonylphenol	ug/L	0.750	1	8/8/2010	1.959 mgd	< 0.750
4-n-Octylphenol	ug/L	0.500	1	8/8/2010	1.959 mgd	< 0.500
4-tert-Octylphenol	ug/L	0.750	1	8/8/2010	1.959 mgd	< 0.750
Triclosan	ug/L	0.750	1	8/8/2010	1.959 mgd	< 0.750

Note: Triclosan and caffeine were analyzed by BOTH methods.
** 2010 COC form- under "Station Description + Notes" it has an "FB" next to "Meter Station ID 6."

Location	**Meter Station**
Sample Date	**5/11/2010**
Sample Time	**15:46**
Preservative (yes/no)	no
EPA Lab ID	1005005-08 A

LCMS ANALYSIS

	Units	Report Limit	Dilution factor	Analysis date	Flow rate	Results
Atrazine	ng/L	10	1	7/30/2010	1.959 mgd	< 10.0
Caffeine	ng/L	1250	50	8/5/2010	1.959 mgd	124000.0
Cotinine	ng/L	500	50	8/5/2010	1.959 mgd	1860.0
DEET	ng/L	25	1	7/30/2010	1.959 mgd	< 25.0
Methylparaben	ng/L	25	1	8/8/2010	1.959 mgd	472.0
N-Butylparaben	ng/L	10	1	8/8/2010	1.959 mgd	22.2
Triclosan	ng/L	250	25	8/8/2010	1.959 mgd	4380.0

GCMS ANALYSIS

	Units	Report Limit	Dilution factor	Analysis date	Flow rate	Results
Benzophenone	ug/L	0.750	1	8/8/2010	1.959 mgd	2.100
BHA	ug/L	0.750	1	8/8/2010	1.959 mgd	4.300
BPA (bisphenol A)	ug/L	0.750	1	8/8/2010	1.959 mgd	16.000
Caffeine	ug/L	1.250	1	8/8/2010	1.959 mgd	90.000
Nonylphenol	ug/L	0.750	1	8/8/2010	1.959 mgd	7.350
4-n-Octylphenol	ug/L	0.500	1	8/8/2010	1.959 mgd	< 0.500
4-tert-Octylphenol	ug/L	0.750	1	8/8/2010	1.959 mgd	4.700
Triclosan	ug/L	0.750	1	8/8/2010	1.959 mgd	10.300

Note: Triclosan and caffeine were analyzed by BOTH methods.

IES-CEC Wastewater Sample Analysis, City of Golden, CO (April-May 2009)

Data Source: U.S. Environmental Protection Agency-Region 8-Technical and Management Services

Sample Date	**4/24/09**
Sample Time	**9:00**
Preservative (yes/no)	yes- Sodium Azide
EPA Lab ID	1006013-05 A

LCMS ANALYSIS

	Units	Report Limit	Dilution factor	Analysis date	Flow rate	Results
Atrazine	ng/L	10	1	7/29/2010	1.843 mgd	< 10.0
Caffeine	ng/L	1250	50	8/5/2010	1.843 mgd	189000
Cotinine	ng/L	500	50	8/5/2010	1.843 mgd	2520
DEET	ng/L	25	1	7/29/2010	1.843 mgd	194
Methylparaben	ng/L	25	1	7/23/2010	1.843 mgd	53
N-Butylparaben	ng/L	10	1	7/23/2010	1.843 mgd	< 10.0
Triclosan	ng/L	10	1	7/23/2010	1.843 mgd	1790

GCMS ANALYSIS

	Units	Report Limit	Dilution factor	Analysis date	Flow rate	Results
Benzophenone	ug/L	0.186	1	6/25/2010	1.843 mgd	0.917
Butylated hydroxyanisole (BHA)	ug/L	0.186	1	6/25/2010	1.843 mgd	0.446
BPA (bisphenol A)	ug/L	0.186	1	6/25/2010	1.843 mgd	< 0.186
Caffeine	ug/L	7.740	25	6/25/2010	1.843 mgd	210.000
Nonylphenol	ug/L	0.186	1	6/25/2010	1.843 mgd	2.030
4-n-Octylphenol	ug/L	0.124	1	6/25/2010	1.843 mgd	< 0.124
4-tert-Octylphenol	ug/L	0.186	1	6/25/2010	1.843 mgd	0.297
Triclosan	ug/L	0.186	1	6/25/2010	1.843 mgd	3.480

Note: Triclosan and caffeine were analyzed by BOTH methods.

Sample Date	**4/24/09**
Sample Time	**11:58**

Preservative (yes/no) yes- Sodium Azide
EPA Lab ID 1006013-09 A

LCMS ANALYSIS

	Units	Report Limit	Dilution factor	Analysis date	Flow rate	Results
Atrazine	ng/L	10	1	7/29/2010	1.843 mgd	< 10.0
Caffeine	ng/L	1250	50	8/5/2010	1.843 mgd	118000.0
Cotinine	ng/L	500	50	8/5/2010	1.843 mgd	3180.0
DEET	ng/L	25	1	7/29/2010	1.843 mgd	272.0
Methylparaben	ng/L	25	1	7/23/2010	1.843 mgd	71.1
N-Butylparaben	ng/L	10	1	7/23/2010	1.843 mgd	72.5
Triclosan	ng/L	10	1	7/23/2010	1.843 mgd	2530.0

GCMS ANALYSIS

	Units	Report Limit	Dilution factor	Analysis date	Flow rate	Results
Benzophenone	ug/L	0.188	1	6/25/2010	1.843 mgd	1.040
Butylated hydroxyanisole (BHA)	ug/L	0.188	1	6/25/2010	1.843 mgd	0.427
BPA (bisphenol A)	ug/L	0.188	1	6/25/2010	1.843 mgd	< 0.188
Caffeine	ug/L	7.850	25	6/25/2010	1.843 mgd	136.000
Nonylphenol	ug/L	0.188	1	6/25/2010	1.843 mgd	2.580
4-n-Octylphenol	ug/L	0.126	1	6/25/2010	1.843 mgd	< 0.126
4-tert-Octylphenol	ug/L	0.188	1	6/25/2010	1.843 mgd	0.704
Triclosan	ug/L	0.188	1	6/25/2010	1.843 mgd	3.790

Note: Triclosan and caffeine were analyzed by BOTH methods.

Sample Date **4/24/09** *Note COC marks this day as 01/24/09. Possible Typo?
Sample Time **14:00**
Preservative (yes/no) yes- Sodium Azide
EPA Lab ID 1006013-12 A

LCMS ANALYSIS

	Units	Report Limit	Dilution factor	Analysis date	Flow rate	Results
Atrazine	ng/L	10	1	7/29/2010	1.843 mgd	< 10.0

Caffeine	ng/L	1250	50	8/5/2010	1.843 mgd	171000
Cotinine	ng/L	500	50	8/5/2010	1.843 mgd	2700
DEET	ng/L	25	1	7/29/2010	1.843 mgd	312
Methylparaben	ng/L	25	1	7/23/2010	1.843 mgd	129
N-Butylparaben	ng/L	10	1	7/23/2010	1.843 mgd	122
Triclosan	ng/L	250	25	8/8/2010	1.843 mgd	2490

GCMS ANALYSIS

	Units	**Report Limit**	**Dilution factor**	**Analysis date**	**Flow rate**	Results
Benzophenone		0.182	1	6/26/2010	1.843 mgd	1.050
Butylated hydroxyanisole (BHA)	ug/L	0.182	1	6/26/2010	1.843 mgd	0.593
BPA (bisphenol A)	ug/L	0.182	1	6/26/2010	1.843 mgd	< 0.182
Caffeine	ug/L	7.570	25	6/26/2010	1.843 mgd	133.000
Nonylphenol	ug/L	0.182	1	6/26/2010	1.843 mgd	2.240
4-n-Octylphenol	ug/L	0.121	1	6/26/2010	1.843 mgd	<0.121
4-tert-Octylphenol	ug/L	0.182	1	6/26/2010	1.843 mgd	1.250
Triclosan	ug/L	0.182	1	6/26/2010	1.843 mgd	5.500

Note: Triclosan and caffeine were analyzed by BOTH methods.

IES-CEC Wastewater Sample Analysis, City of Golden, CO (April-May 2009)

Data Source: U.S. Environmental Protection Agency-Region 8-Technical and Management Services

Sample Date	**4/27/09**
Sample Time	**9:00**
Preservative (yes/no)	yes- Sodium Azide
EPA Lab ID	1006013-01 A

LCMS ANALYSIS

	Units	Report Limit	Dilution factor	Analysis date	Flow rate	Results
Atrazine	ng/L	10	1	7/29/2010	2.147 mgd	12.5
Caffeine	ng/L	1250	50	8/5/2010	2.147 mgd	240000.0
Cotinine	ng/L	500	50	8/5/2010	2.147 mgd	2160.0
DEET	ng/L	25	1	7/29/2010	2.147 mgd	586.0
Methylparaben	ng/L	25	1	7/23/2010	2.147 mgd	42.2
N-Butylparaben	ng/L	10	1	7/23/2010	2.147 mgd	< 10.0
Triclosan	ng/L	10	1	7/23/2010	2.147 mgd	1550.0

GCMS ANALYSIS

	Units	Report Limit	Dilution factor	Analysis date	Flow rate	Results
Benzophenone	ug/L	0.183	1	6/25/2010	2.147 mgd	0.828
Butylated hydroxyanisole (BHA)	ug/L	0.183	1	6/25/2010	2.147 mgd	0.341
BPA (bisphenol A)	ug/L	0.183	1	6/25/2010	2.147 mgd	< 0.183
Caffeine	ug/L	7.610	25	6/25/2010	2.147 mgd	149.000
Nonylphenol	ug/L	0.183	1	6/25/2010	2.147 mgd	2.310
4-n-Octylphenol	ug/L	0.122	1	6/25/2010	2.147 mgd	< 0.122
4-tert-Octylphenol	ug/L	0.183	1	6/25/2010	2.147 mgd	2.010
Triclosan	ug/L	0.183	1	6/25/2010	2.147 mgd	2.900

Note: Triclosan and caffeine were analyzed by BOTH methods.

Sample Date **4/27/09**

Sample Time	**12:04**
Preservative (yes/no)	yes- Sodium Azide
EPA Lab ID	1006013-08 A

LCMS ANALYSIS

	Units	Report Limit	Dilution factor	Analysis date	Flow rate	Results
Atrazine	ng/L	10	1	7/29/2010	2.147 mgd	< 10.0
Caffeine	ng/L	1250	50	8/5/2010	2.147 mgd	122000.0
Cotinine	ng/L	500	50	8/5/2010	2.147 mgd	1980.0
DEET	ng/L	25	1	7/29/2010	2.147 mgd	1020.0
Methylparaben	ng/L	25	1	7/23/2010	2.147 mgd	106.0
N-Butylparaben	ng/L	10	1	7/23/2010	2.147 mgd	23.7
Triclosan	ng/L	10	1	7/23/2010	2.147 mgd	2710.0

GCMS ANALYSIS

	Units	Report Limit	Dilution factor	Analysis date	Flow rate	Results
Benzophenone	ug/L	0.178	1	6/25/2010	2.147 mgd	1.100
Butylated hydroxyanisole (BHA)	ug/L	0.178	1	6/25/2010	2.147 mgd	< 0.178
BPA (bisphenol A)	ug/L	0.178	1	6/25/2010	2.147 mgd	< 0.178
Caffeine	ug/L	7.400	25	6/25/2010	2.147 mgd	189.000
Nonylphenol	ug/L	0.178	1	6/25/2010	2.147 mgd	< 0.178
4-n-Octylphenol	ug/L	0.118	1	6/25/2010	2.147 mgd	< 0.118
4-tert-Octylphenol	ug/L	0.178	1	6/25/2010	2.147 mgd	< 0.178
Triclosan	ug/L	0.178	1	6/25/2010	2.147 mgd	5.020

Note: Triclosan and caffeine were analyzed by BOTH methods.

Sample Date	**4/27/09**
Sample Time	**14:00**
Preservative (yes/no)	yes- Sodium Azide
EPA Lab ID	1006013-04 A

LCMS ANALYSIS

	Units	Report Limit	Dilution factor	Analysis date	Flow rate	Results

Atrazine	ng/L	10	1	7/29/2010	2.147 mgd	< 10.0
Caffeine	ng/L	1250	50	8/5/2010	2.147 mgd	140000.0
Cotinine	ng/L	500	50	8/5/2010	2.147 mgd	2400.0
DEET	ng/L	25	1	7/29/2010	2.147 mgd	242.0
Methylparaben	ng/L	25	1	7/23/2010	2.147 mgd	53.7
N-Butylparaben	ng/L	10	1	7/23/2010	2.147 mgd	66.1
Triclosan	ng/L	250	25	8/8/2010	2.147 mgd	4320.0

GCMS ANALYSIS

	Units	**Report Limit**	**Dilution factor**	**Analysis date**	**Flow rate**	Results
Benzophenone	ug/L	0.174	1	6/25/2010	2.147 mgd	0.892
Butylated hydroxyanisole (BHA)	ug/L	0.174	1	6/25/2010	2.147 mgd	0.823
BPA (bisphenol A)	ug/L	0.174	1	6/25/2010	2.147 mgd	< 0.174
Caffeine	ug/L	7.240	25	6/25/2010	2.147 mgd	236.000
Nonylphenol	ug/L	0.174	1	6/25/2010	2.147 mgd	3.200
4-n-Octylphenol	ug/L	0.116	1	6/25/2010	2.147 mgd	< 0.116
4-tert-Octylphenol	ug/L	0.174	1	6/25/2010	2.147 mgd	0.765
Triclosan	ug/L	0.174	1	6/25/2010	2.147 mgd	6.580

Note: Triclosan and caffeine were analyzed by BOTH methods.

IES-CEC Wastewater Sample Analysis, City of Golden, CO (April-May 2009)

Data Source: U.S. Environmental Protection Agency-Region 8-Technical and Management Services

Sample Date	**4/28/09**
Sample Time	**9:05**
Preservative (yes/no)	yes- Sodium Azide
EPA Lab ID	1006013-02 A

LCMS ANALYSIS

	Units	Report Limit	Dilution factor	Analysis date	Flow rate	Results
Atrazine	ng/L	10	1	7/29/2010	2.046 mgd	< 10.0
Caffeine	ng/L	1250	50	8/5/2010	2.046 mgd	227000.0
Cotinine	ng/L	500	50	8/5/2010	2.046 mgd	3000.0
DEET	ng/L	25	1	7/29/2010	2.046 mgd	796.0
Methylparaben	ng/L	25	1	7/23/2010	2.046 mgd	37.3
N-Butylparaben	ng/L	10	1	7/23/2010	2.046 mgd	15.4
Triclosan	ng/L	10	1	7/23/2010	2.046 mgd	2080.0

GCMS ANALYSIS

	Units	Report Limit	Dilution factor	Analysis date	Flow rate	Results
Benzophenone	ug/L	0.185	1	6/25/2010	2.046 mgd	0.914
Butylated hydroxyanisole (BHA)	ug/L	0.185	1	6/25/2010	2.046 mgd	0.753
BPA (bisphenol A)	ug/L	0.185	1	6/25/2010	2.046 mgd	1.740
Caffeine	ug/L	7.720	25	6/25/2010	2.046 mgd	174.000
Nonylphenol	ug/L	0.185	1	6/25/2010	2.046 mgd	2.440
4-n-Octylphenol	ug/L	0.123	1	6/25/2010	2.046 mgd	0.284
4-tert-Octylphenol	ug/L	0.185	1	6/25/2010	2.046 mgd	0.321
Triclosan	ug/L	0.185	1	6/25/2010	2.046 mgd	4.150

Note: Triclosan and caffeine were analyzed by BOTH methods.

Sample Date	**4/28/09**
Sample Time	**12:00**

Preservative (yes/no)	yes- Sodium Azide
EPA Lab ID	1006013-06 A

LCMS ANALYSIS

	Units	Report Limit	Dilution factor	Analysis date	Flow rate	Results
Atrazine	ng/L	10	1	7/29/2010	2.046 mgd	< 10.0
Caffeine	ng/L	1250	50	8/5/2010	2.046 mgd	123000.0
Cotinine	ng/L	500	50	8/5/2010	2.046 mgd	2480.0
DEET	ng/L	25	1	7/29/2010	2.046 mgd	650.0
Methylparaben	ng/L	25	1	7/23/2010	2.046 mgd	54.8
N-Butylparaben	ng/L	10	1	7/23/2010	2.046 mgd	10.1
Triclosan	ng/L	10	1	7/23/2010	2.046 mgd	1810.0

GCMS ANALYSIS

	Units	Report Limit	Dilution factor	Analysis date	Flow rate	Results
Benzophenone	ug/L	0.181	1	6/25/2010	2.046 mgd	1.070
Butylated hydroxyanisole (BHA)	ug/L	0.181	1	6/25/2010	2.046 mgd	0.446
BPA (bisphenol A)	ug/L	0.181	1	6/25/2010	2.046 mgd	< 0.181
Caffeine	ug/L	7.530	25	6/25/2010	2.046 mgd	93.700
Nonylphenol	ug/L	0.181	1	6/25/2010	2.046 mgd	2.800
4-n-Octylphenol	ug/L	0.120	1	6/25/2010	2.046 mgd	< 0.120
4-tert-Octylphenol	ug/L	0.181	1	6/25/2010	2.046 mgd	2.170
Triclosan	ug/L	0.181	1	6/25/2010	2.046 mgd	3.450

Note: Triclosan and caffeine were analyzed by BOTH methods.

Sample Date	**4/28/09**
Sample Time	**13:55**
Preservative (yes/no)	yes- Sodium Azide
EPA Lab ID	1006013-10 A

LCMS ANALYSIS

	Units	Report Limit	Dilution factor	Analysis date	Flow rate	Results
Atrazine	ng/L	10	1	7/29/2010	2.046 mgd	< 10.0

Caffeine	ng/L	1250	50	8/5/2010	2.046 mgd	100000.0
Cotinine	ng/L	500	50	8/5/2010	2.046 mgd	2290.0
DEET	ng/L	25	1	7/29/2010	2.046 mgd	193.0
Methylparaben	ng/L	25	1	7/23/2010	2.046 mgd	66.6
N-Butylparaben	ng/L	10	1	7/23/2010	2.046 mgd	22.3
Triclosan	ng/L	10	1	7/23/2010	2.046 mgd	2260.0

GCMS ANALYSIS

	Units	**Report Limit**	**Dilution factor**	**Analysis date**	**Flow rate**	Results
Benzophenone	ug/L	0.194	1	6/25/2010	2.046 mgd	0.877
Butylated hydroxyanisole (BHA)	ug/L	0.194	1	6/25/2010	2.046 mgd	0.284
BPA (bisphenol A)	ug/L	0.194	1	6/25/2010	2.046 mgd	< 0.194
Caffeine	ug/L	8.060	25	6/25/2010	2.046 mgd	93.200
Nonylphenol	ug/L	0.194	1	6/25/2010	2.046 mgd	1.910
4-n-Octylphenol	ug/L	0.129	1	6/25/2010	2.046 mgd	< 0.129
4-tert-Octylphenol	ug/L	0.194	1	6/25/2010	2.046 mgd	2.050
Triclosan	ug/L	0.194	1	6/25/2010	2.046 mgd	3.650

Note: Triclosan and caffeine were analyzed by BOTH methods.

IES-CEC Wastewater Sample Analysis, City of Golden, CO (April-May 2009)

Data Source: U.S. Environmental Protection Agency-Region 8-Technical and Management Services

Sample Date	**4/29/09**
Sample Time	**9:05**
Preservative (yes/no)	yes- Sodium Azide
EPA Lab ID	1006013-07 A

LCMS ANALYSIS

	Units	Report Limit	Dilution factor	Analysis date	Flow rate	Results
Atrazine	ng/L	10	1	7/29/2010	No Data	< 10.0
Caffeine	ng/L	1250	50	8/5/2010	No Data	144000.0
Cotinine	ng/L	500	50	8/5/2010	No Data	2520.0
DEET	ng/L	25	1	7/29/2010	No Data	196.0
Methylparaben	ng/L	25	1	7/23/2010	No Data	59.0
N-Butylparaben	ng/L	10	1	7/23/2010	No Data	41.6
Triclosan	ng/L	250	25	8/8/2010	No Data	2440.0

GCMS ANALYSIS

	Units	Report Limit	Dilution factor	Analysis date	Flow rate	Results
Benzophenone	ug/L	0.186	1	6/25/2010	No Data	0.990
Butylated hydroxyanisole (BHA)	ug/L	0.186	1	6/25/2010	No Data	0.792
BPA (bisphenol A)	ug/L	0.186	1	6/25/2010	No Data	< 0.186
Caffeine	ug/L	7.740	25	6/25/2010	No Data	119.000
Nonylphenol	ug/L	0.186	1	6/25/2010	No Data	3.450
4-n-Octylphenol	ug/L	0.124	1	6/25/2010	No Data	< 0.124
4-tert-Octylphenol	ug/L	0.186	1	6/25/2010	No Data	1.960
Triclosan	ug/L	0.186	1	6/25/2010	No Data	4.390

Note: Triclosan and caffeine were analyzed by BOTH methods.

Sample Date	**4/29/09**
Sample Time	**11:45**

Preservative (yes/no)	yes- Sodium Azide
EPA Lab ID	1006013-14 A

LCMS ANALYSIS

	Units	Report Limit	Dilution factor	Analysis date	Flow rate	Results
Atrazine	ng/L	10	1	7/29/2010	No Data	< 10.0
Caffeine	ng/L	1250	50	8/5/2010	No Data	346000.0
Cotinine	ng/L	500	50	8/5/2010	No Data	2540.0
DEET	ng/L	25	1	7/29/2010	No Data	464.0
Methylparaben	ng/L	25	1	7/23/2010	No Data	134.0
N-Butylparaben	ng/L	10	1	7/23/2010	No Data	57.4
Triclosan	ng/L	250	25	8/8/2010	No Data	2070.0

GCMS ANALYSIS

	Units	Report Limit	Dilution factor	Analysis date	Flow rate	Results
Benzophenone	ug/L	0.323	1	6/26/2010	No Data	0.948
Butylated hydroxyanisole (BHA)	ug/L	0.323	1	6/26/2010	No Data	0.733
BPA (bisphenol A)	ug/L	0.323	1	6/26/2010	No Data	< 0.323
Caffeine	ug/L	13.500	25	6/26/2010	No Data	209.000
Nonylphenol	ug/L	0.323	1	6/26/2010	No Data	3.490
4-n-Octylphenol	ug/L	0.216	1	6/26/2010	No Data	< 0.216
4-tert-Octylphenol	ug/L	0.323	1	6/26/2010	No Data	2.540
Triclosan	ug/L	0.323	1	6/26/2010	No Data	5.580

Note: Triclosan and caffeine were analyzed by BOTH methods.

Sample Date	**4/29/09**
Sample Time	**14:00**
Preservative (yes/no)	yes- Sodium Azide
EPA Lab ID	1006013-01 A

LCMS ANALYSIS

	Units	Report Limit	Dilution factor	Analysis date	Flow rate	Results
Atrazine	N/A	N/A	N/A	N/A	N/A	N/A
Caffeine	N/A	N/A	N/A	N/A	N/A	N/A
Cotinine	N/A	N/A	N/A	N/A	N/A	N/A
DEET	N/A	N/A	N/A	N/A	N/A	N/A
Methylparaben	N/A	N/A	N/A	N/A	N/A	N/A
N-Butylparaben	N/A	N/A	N/A	N/A	N/A	N/A
Triclosan	N/A	N/A	N/A	N/A	N/A	N/A

GCMS ANALYSIS

	Units	Report Limit	Dilution factor	Analysis date	Flow rate	Results
Benzophenone	N/A	N/A	N/A	N/A	N/A	N/A
Butylated hydroxyanisole (BHA)	N/A	N/A	N/A	N/A	N/A	N/A
BPA (bisphenol A)	N/A	N/A	N/A	N/A	N/A	N/A
Caffeine	N/A	N/A	N/A	N/A	N/A	N/A
Nonylphenol	N/A	N/A	N/A	N/A	N/A	N/A
Octylphenol	N/A	N/A	N/A	N/A	N/A	N/A
Triclosan	N/A	N/A	N/A	N/A	N/A	N/A

Note: Triclosan and caffeine were analyzed by BOTH methods.

IES-CEC Wastewater Sample Analysis, City of Golden, CO (April-May 2009)

Data Source: U.S. Environmental Protection Agency-Region 8-Technical and Management Services

Sample Date	**5/1/09**
Sample Time	**9:00**
Preservative (yes/no)	yes- Sodium Azide
EPA Lab ID	1006013-03 A

LCMS ANALYSIS

	Units	Report Limit	Dilution factor	Analysis date	Flow rate	Results
Atrazine	ng/L	10	1	7/29/2010	1.908 mgd	< 10.0
Caffeine	ng/L	1250	50	8/5/2010	1.908 mgd	226000.0
Cotinine	ng/L	500	50	8/5/2010	1.908 mgd	3260.0
DEET	ng/L	25	1	7/29/2010	1.908 mgd	154.0
Methylparaben	ng/L	25	1	7/23/2010	1.908 mgd	61.7
N-Butylparaben	ng/L	10	1	7/23/2010	1.908 mgd	10.7
Triclosan	ng/L	10	1	7/23/2010	1.908 mgd	2420.0

GCMS ANALYSIS

	Units	Report Limit	Dilution factor	Analysis date	Flow rate	Results
Benzophenone	ug/L	0.187	1	6/25/2010	1.908 mgd	1.090
Butylated hydroxyanisole (BHA)	ug/L	0.187	1	6/25/2010	1.908 mgd	0.597
BPA (bisphenol A)	ug/L	0.187	1	6/25/2010	1.908 mgd	< 0.187
Caffeine	ug/L	7.770	25	6/25/2010	1.908 mgd	174.000
Nonylphenol	ug/L	0.187	1	6/25/2010	1.908 mgd	3.250
4-n-Octylphenol	ug/L	0.124	1	6/25/2010	1.908 mgd	< 0.124
4-tert-Octylphenol	ug/L	0.187	1	6/25/2010	1.908 mgd	2.000
Triclosan	ug/L	0.187	1	6/25/2010	1.908 mgd	4.880

Note: Triclosan and caffeine were analyzed by BOTH methods.

Sample Date	**5/1/09**
Sample Time	**12:05**
Preservative (yes/no)	yes- Sodium Azide
EPA Lab ID	1006013-13 A

LCMS ANALYSIS

	Units	Report Limit	Dilution factor	Analysis date	Flow rate	Results
Atrazine	ng/L	10	1	7/29/2010	1.908 mgd	< 10.0
Caffeine	ng/L	1250	50	8/5/2010	1.908 mgd	222000.0
Cotinine	ng/L	500	50	8/5/2010	1.908 mgd	3620.0
DEET	ng/L	25	1	7/29/2010	1.908 mgd	685.0
Methylparaben	ng/L	25	1	7/23/2010	1.908 mgd	63.7
N-Butylparaben	ng/L	10	1	7/23/2010	1.908 mgd	43.0
Triclosan	ng/L	250	25	8/8/2010	1.908 mgd	3120.0

GCMS ANALYSIS

	Units	Report Limit	Dilution factor	Analysis date	Flow rate	Results
Benzophenone	ug/L	0.187	1	6/26/2010	1.908 mgd	0.935
Butylated hydroxyanisole (BHA)	ug/L	0.187	1	6/26/2010	1.908 mgd	0.810
BPA (bisphenol A)	ug/L	0.187	1	6/26/2010	1.908 mgd	< 0.187
Caffeine	ug/L	7.790	25	6/26/2010	1.908 mgd	118.000
Nonylphenol	ug/L	0.187	1	6/26/2010	1.908 mgd	3.190
4-n-Octylphenol	ug/L	0.125	1	6/26/2010	1.908 mgd	< 0.125
4-tert-Octylphenol	ug/L	0.187	1	6/26/2010	1.908 mgd	0.499
Triclosan	ug/L	0.187	1	6/26/2010	1.908 mgd	4.760

Note: Triclosan and caffeine were analyzed by BOTH methods.

Sample Date	**5/1/09**
Sample Time	**13:45**
Preservative (yes/no)	yes- Sodium Azide
EPA Lab ID	1006013-11 A

LCMS ANALYSIS

	Units	Report Limit	Dilution factor	Analysis date	Flow rate	Results

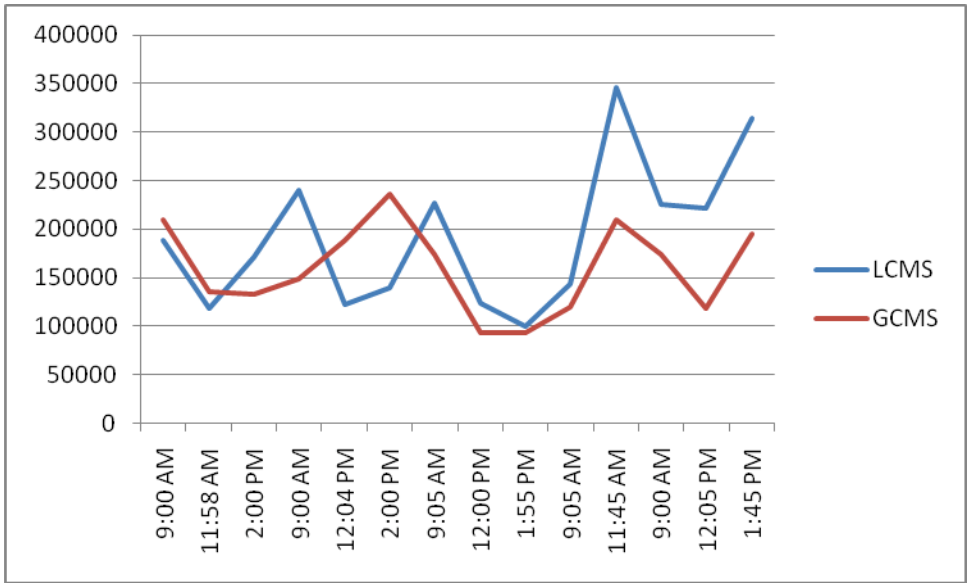
Atrazine	ng/L	10	1	7/29/2010	1.908 mgd	< 10.0
Caffeine	ng/L	1250	50	8/5/2010	1.908 mgd	314000.0
Cotinine	ng/L	10	1	7/29/2010	1.908 mgd	2310.0
DEET	ng/L	1250	50	8/5/2010	1.908 mgd	2230.0
Methylparaben	ng/L	25	1	7/23/2010	1.908 mgd	132.0
N-Butylparaben	ng/L	10	1	7/23/2010	1.908 mgd	40.1
Triclosan	ng/L	250	25	8/8/2010	1.908 mgd	2140.0

GCMS ANALYSIS

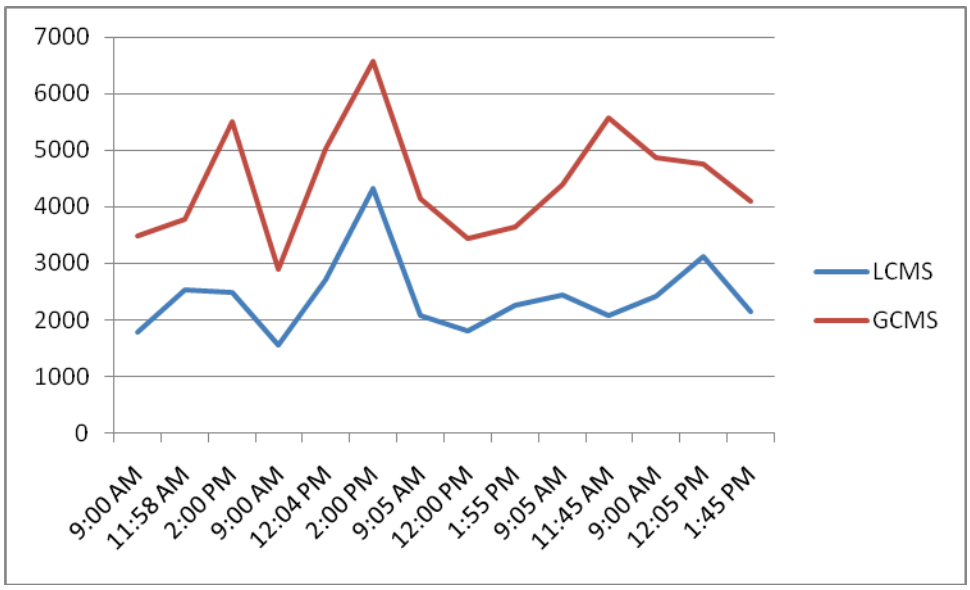
	Units	**Report Limit**	**Dilution factor**	**Analysis date**	**Flow rate**	Results
Benzophenone	ug/L	0.185	1	6/26/2010	1.908 mgd	0.887
Butylated hydroxyanisole (BHA)	ug/L	0.185	1	6/26/2010	1.908 mgd	< 0.185
BPA (bisphenol A)	ug/L	0.185	1	6/26/2010	1.908 mgd	< 0.185
Caffeine	ug/L	7.700	25	6/26/2010	1.908 mgd	195.000
Nonylphenol	ug/L	0.185	1	6/26/2010	1.908 mgd	2.570
4-n-Octylphenol	ug/L	0.123	1	6/26/2010	1.908 mgd	< 0.123
4-tert-Octylphenol	ug/L	0.185	1	6/26/2010	1.908 mgd	< 0.185
Triclosan	ug/L	0.185	1	6/26/2010	1.908 mgd	4.100

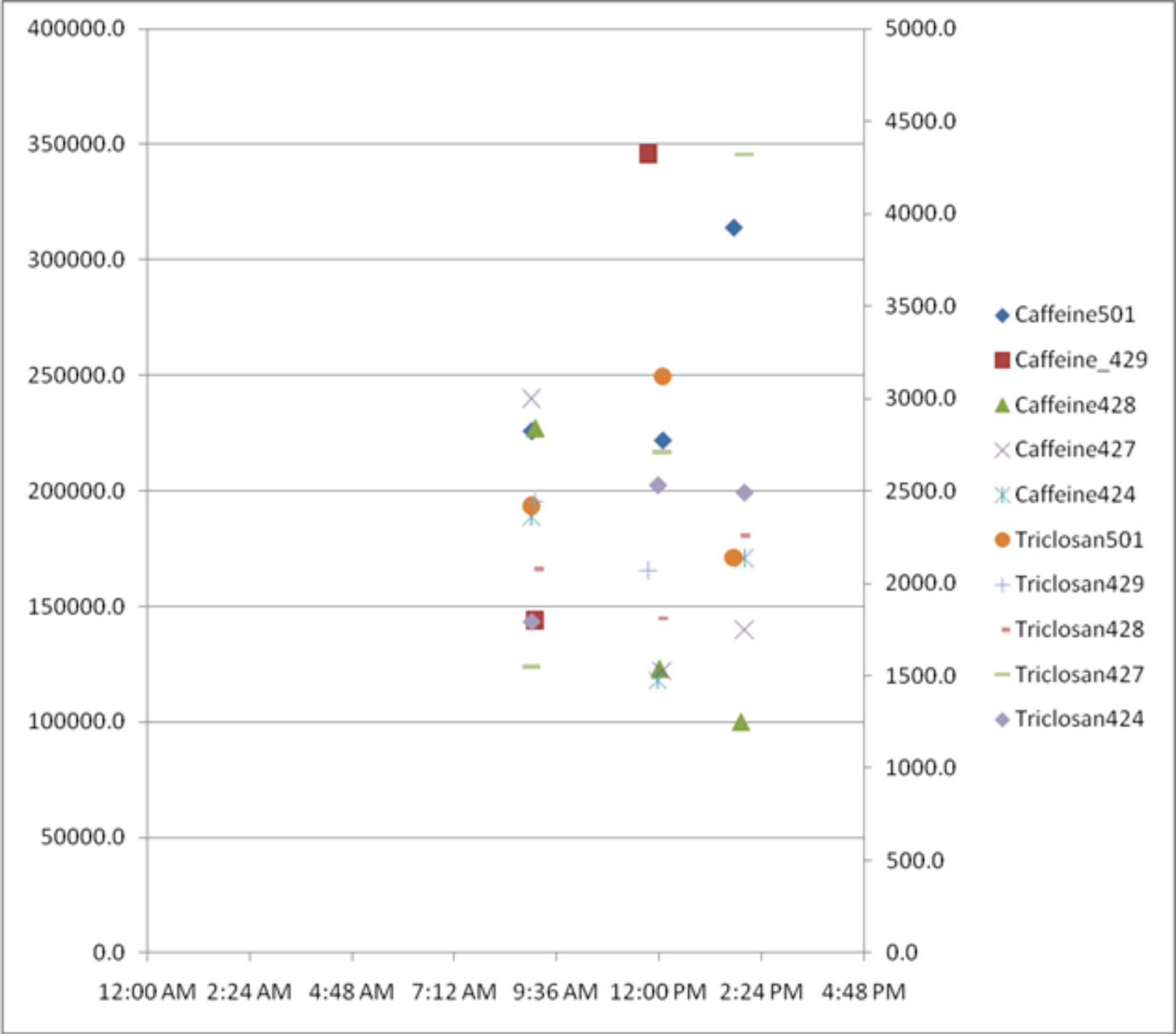
Note: Triclosan and caffeine were analyzed by BOTH methods.

Caffeine, Spring 2009



Triclosan, Spring 2009

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500.0
0.0
12:00 AM
2:24 AM
4:48 AM
7:12 AM
9:36 AM
12:00 PM
2:24 PM
4:48 PM
Caffeine501
Caffeine_429
Caffeine428
Caffeine427
Caffeine424
Triclosan501
Triclosan429
Triclosan428
Triclosan427
Triclosan424

INSTITUTE FOR ENVIRONMENTAL SOLUTIONS
EMERGING CONTAMINANTS: Linking Science to Effective Action
Steering Committee

Draft, December 1, 2008; Update 1/21/09; 2/10/09; 5/13/09
Update 12/9/09

Organization Name	Stake Category	T	First Name	Last Name	Job Title	Address	City	ST	Zip Code	Telephone	Email
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		Dr.	Victor	Hahn	Analytical Services Division	6450 York Street	Denver	CO	80229-7499	303-286-3395	Vhahn@mwrd.dst.co.us
Boulder County Public Health, Partners for a Clean Environment	Local Government	Mr.	Bill	Hayes		3450 Broadway	Boulder	CO	80304	303-441-1574	bhayes@bouldercounty.org
U.S. Environmental Protection Agency (EPA)	Federal Government	Dr.	Kristen	Keteles	Toxicologist, U.S. EPA Region 8	1595 Wynkoop Street, 8P-P3T	Denver	CO	80202	303-312-6039	keteles.kristen@epa.gov
		Dr.	Mark A.	Murphy	Chemist, EPA Region 8 Lab	16194 West 45th Street	Denver	CO	80403	303-312-7775	Murphy.Mark@EPA.gov
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City of Golden	Local Government	Ms.	Vicki	Coppage	Senior Chemist/ Pretreatment Coordinator	1445 10th St.	Golden	CO	80401	303-384-8182	Vcoppage@ci.Golden.CO.US
		Ms.	Stephanie	Crabtree	Chemist/ Environmental Specialist					303-384-8184	Scrabtree@CityofGolden.net
The SeaCrest Group	Management & Consulting	Mr.	Shannon D.	Phelps	President	1341 Cannon Street	Louisville	CO	80027	303-661-9324	sphelps@seacrestgroup.com
New Belgium Brewing Company - Do not send meeting notices.	End User	Mr.	Brandon	Weaver	Process Wastewater Treatment Plant Lead Operator; Mechanical Technician	500 Linden Street	Fort Collins	CO	80524	970-231-4266 (cell)	Bweaver@newbelgium.com

Roche Colorado	Pharmaceutical Manufacturers	Mr.	Jim	Wilson, P.E., Esq.	Vice President, Senior Legal Counsel	2075 North 55th Street	Boulder	CO	80301	303-938-6404	james_m.wilson@roche.com
		Mr.	Luke	Johnson	Quality Control Manager					303-938-6409	luke.johnson@roche.com
City of Golden	Local Government	Ms.	Theresa	Worsham	Sustainability Coordinator	1445 10th St.	Golden	CO	80401	303-384-8117	tworsham@cityofgolden.net
Send meeting notices to:											
City and County of Denver	Local Government	Ms.	Jeannette	Sutton	Social Marketing Program Administrator, Environmental Health, Dept 1009	201 West Colfax Avenue	Denver	CO	80202	720-865-5467	Jeannette.Sutton@denvergov.org

Contaminants of Emerging Concern Final Report
Final Report
Outline
Scheduled for completion January 15, 2011

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CHAPTER I

INTRODUCTION AND OVERVIEW

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      - i. Background and Demographic
      - ii. Methods
      - iii. Locale
    - e. Results and Conclusions
    - f. Appendices and references
- B. OUTREACH
  - 1. Overview
    - a. Goal was to establish presence - social diffusion
    - b. Overview of CBSM methodology as it relates to outreach
    - c. Tap into established community groups
    - d. Fits in with larger goal of CEC
  - 2. Elements of Outreach
    - a. Community events - Workshops
      - (i) Heather
      - (ii) Workshop participants passing on information
      - (iii) Front Porch
    - b. Benefits Fair
    - c. Community Walk
    - d. Community leaders and groups
      - i. Mayor Jacob Smith – posted announcements about IES workshops and survey
      - ii. Judy Denison – e-newsletter used for sending out survey information in addition to the educational blurbs
      - iii. Marjorie Sloan – City council member with e-newsletter
      - iv. Bill Fisher - City council member with e-newsletter
      - v. City of Golden -
      - vi. Chamber of Commerce
        - (i) Monthly mailings of fliers from Golden businesses, nonprofits, groups etc.

(ii) Contributed fliers and announcements about surveys
vii. Anne Beierle
e. Related Non-profits
i. CAEE
ii. CREEC
iii. CWA
f. Steering Committee
i. Introduced outreach opportunities
ii. Introduced funding opportunities
iii. Provided insight to Golden community
3. Program Planning and Design - Determined purpose of outreach
i. Providing education
ii. Workshops
iii. Surveys
4. Implementation
a. Frequency of contribution
b. Successes - Need to create a relationship and isolate key contacts
c. Key elements
d. Failures
5. Results
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b. Overview of contributions
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a. Establish timelines for contribution
b. Find outlets early on and utilize throughout program

C. WORKSHOPS
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b. Deciding where to hold workshops
c. Choosing dates
d. Creating the basic structure for the workshops.
2. EDUCATION SECTION
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b. Question and Answer
c. Handouts
3. OUTREACH
a. Advertising through print media
i. Which newspapers we used
ii. Successes and problems
b. Fliers
i. Distributed electronically
ii. Distributed throughout Golden
(i) Where
(ii) Success
c. Personal e-mails and use of serial mail
d. Outreach through elementary schools
e. Development of Golden contact list

4. WORKSHOP 1: Front Porch Green Cleaning Workshop (Feb)
    a. Successes
    b. Problems
    c. What we learned and how we planned to improve for next time.
5. WORKSHOP 2: Beauty Workshop (March)
    a. Successes
    b. Problems
    c. How we planned on improving for next workshop: more outreach.
6. WORKSHOP 3: Workshop for Parents of Young Children (April)
    a. Successes - Enough attendance to carry out workshop
    b. Problems
    c. What we improved upon from last workshop
    d. How we planned on improving for next workshop - Decided to practice activity before the workshop
7. WORKSHOP 4: Green Grocery Shopping (May)
    a. Successes
    b. CBSM in action: Participant told us she brought our green cleaner to her Moms group.
    c. Problems
        i. Lack of prepared response to certain questions regarding government involvement in regulation.
        ii. Balance between reading off script and summarizing off of script.
    d. What we improved upon from last workshop
    e. How we planned on improving for next workshop
8. WORKSHOP 5: Front Porch Beauty Workshop (June)
    a. Successes
    b. Problems
    c. What we improved upon from last workshop
    d. How we planned on improving for next workshop
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    a. Successes
    b. Problems
    c. What we improved upon from last workshop
    d. How we planned on improving for next workshop
10. FINAL THOUGHTS
    a. Continuation of program beyond summer
    b. Analysis

D. DISPLAYS

1. Overview of Section: Description of displays, how does it fit into the larger CEC project?
    a. Displays are one element of a larger educational outreach initiative
    b. Displays included: Large posters, product demonstrations, window posters, fliers, table top/8.5x11 displays
2. Program Planning and Design
    a. Background Research and Discussions
        i. Making Contacts for display locations

ii. Design (content and presentation)
(i) BPA/BHA-Food safety
(ii) CECs- General
iii. Product demonstrations
(i) BPA/BHA
(ii) Cleaning products
(iii) Fliers

1. Top Ten
2. Further Reading
3. Workshop advertisements
4. Buyer's Guide
   Window Posters
5. Top Ten Ways to Reduce- See Inside
6. BPA- Find out why inside
   Table top 8.5x11 posters
7. Triclosan
8. BPA
9. Fragrance

3. IMPLEMENTATION
   a. Printing
   b. Locations
      i. Clear Creek Books
      ii. Golden Public Library
      iii. American Mountaineering Center
      iv. Windy Saddle Coffee (window posters?, flyers)
   c. Contacts: Maintenance: Set Up/Take Down
4. RESULTS
   a. Metrics ex. Supplies taken, feedback, restocking needs
   b. Successes
      i. Positive feedback from Library and AMC
      ii. Requests for restocks from Library and AMC
      iii. Magnets/stickers (Library-general CEC cleaning display) we all taken, which did we use?
      iv. Library and AMC were happy to host multiple displays
   c. Challenges
      a. Securing Locations
         i. Golden River Sports- ex. Of misinformation/ poor communication
         ii. Months without displays scheduled- inefficient, drive time
      b. Missing/Stolen Products
         i. Golden Public Library
         ii. Empty products fall down/don't display as well
      c. Wallet cards were never completely taken - not as popular as magnet/stickers
5. FINDINGS, CONCLUSIONS AND RECOMMENDATIONS
   a. Displays should continue in high traffic areas
   b. New locations or new material is needed

c. Larger posters and new product demos are expensive
d. Take-home prompts like stickers and magnets are taken
e. Wallet cards were not all taken, marginal interest
f. The workshop fliers were mentioned as not professional looking/eye catching
g. Having a long term calendar to book displays would save time and provide efficient use of each display

E. CONCLUSIONS, RECOMMENDATIONS AND RESULTS
F. REFERENCES AND APPENDICES

CHAPTER IV

MEDIA

A. OVERVIEW
1. Elements of CEC Media
a. Articles published in media outlets
b. Educational materials for distribution
c. Logos and other CEC marketing materials
2. Part of education campaign through established community mediums
a. Non-participatory education (as opposed to workshops)
b. Golden based Media Outlets - As opposed to broader ranged
c. Other Educational Media
i. Shoppers Guide
ii. Recipes
iii. Prompts
(i) Wallet Cards
(ii) Magnets

B. PROGRAM PLANNING AND DESIGN
1. Articles
a. Media and outreach graduate intern
b. Recruited other team members to write articles when interested
c. How related to CBSM
2. Educational Material
3. Logos/CEC Marketing Materials

C. BACKGROUND RESEARCH
1. Articles
a. Establishing community's media opportunities
b. Brainstorming article concepts
c. Constant development of educational media
2. Educational Materials
3. CEC Logos /Marketing Materials

D. IMPLEMENTATION
1. Articles
a. Relationship building with editors
i. Constant follow up and outreach to other media outlets
ii. Staying true to IES message while aligning with media outlet's demands. Ex. Informer
b. Team discussions about articles - Team editing

c. Types of articles
    i. Take action
    ii. Newsworthy
    iii. IES related
2. Educational Materials
3. CEC Logos/Marketing Materials

E. RESULTS
1. Articles
    a. Informer
    b. Your Hub
    c. Re-Create
    d. Front Porch
    e. Examiner
    f. Transcript
    g. Reached out but not interested
        i. Oredigger
        ii. City Mountain Views
2. Educational Materials
3. Logos and other CEC Marketing Materials

F. FINDINGS, CONCLUSIONS AND RECOMMENDATIONS
1. Articles
    a. From survey found out people read the Informer
    b. Successful outreach methods
    c. Metrics – Interest Level
2. Educational Materials – Most informative
    a. Shopping Guides
    b. Recipes
3. CEC Logo/Marketing Materials
    a. Cohesive recognizable format and message
    b. Professional graphic designer for help with all materials

CHAPTER V

SURVEY

A. DESIGN AND IMPLEMENTATION
B. OUTREACH/DISTRIBUTION
1. Online
    a. Judy Denison
    b. Marjorie Sloan
    c. Mayor Smith
    d. Bill Fisher
    e. Your Hub
    f. Golden.com
    g. Anne Beierle
2. Community
    a. Chamber of Commerce
    b. Elementary schools

i. Community 5k
ii. Newsletter
c. Pre-schools
d. Colorado School of Mines

C. CONDUCTING SURVEY
1. Overview of Section:
a. Surveys were conducted in Golden, CO. from Aug-Nov in the years of 2009 and 2010.
b. The 2009 survey is known as the "before" survey and 2010 as the "after" survey in order to measure the effectiveness of the year long CEC Pilot program.
2. Program Planning and design
a. Background research and discussions
i. Based on last year's approach?
ii. Called Chamber of Commerce (Gary Wink)
iii. Others (suggestions please!)
3. Implementation
a. Finding locations to survey
i. Golden Chamber of Commerce website
ii. Gary Wink's suggestion
iii. Other networking (Shelton 5k)
b. Mail-in Survey distribution campaigns
i. Chamber of Commerce
ii. Shelton Elementary
iii. Other schools?
iv. Preschools
c. Recruiting CEC team members to survey
i. Excel spreadsheet
ii. Email requests
d. The surveying process
i. Uniform
ii. Approaching people
iii. Detailed directions "How to survey"- see handout
4. Results
a. Successes
i. Locations- School of Mines, Shelton
ii. Times
iii. People
(i) Gary Wink
(ii) Woman from Shelton – Julie, head of PTA?
iv. Mass distributions- Chamber, Shelton, Preschools, others?
b. Challenges
i. Locations
ii. Times – Farmer's Market, Fine Arts attract tourists vs. locals
iii. Recruiting team members to survey
iv. People are very unwilling to stop
v. Any association with "environment" suggests you're asking for money.

5. Findings / Conclusions / Recommendations
    a. Events
        i. Pursue more family/community events like Shelton 5k with a guaranteed attendance
        ii. Avoid events that attract mostly tourists
        iii. Places where people are outside relaxing i.e. campuses, lunch in a park, are successful
    b. Staff
        i. Volunteers are critical to conduct surveys
        ii. Commitment/perhaps incentives are needed
        iii. Staffing for the 2010 surveys was a major limitation
    c. Approach
        i. Look for people alone or not busy
        ii. Assure passersby you are not asking for money
        iii. Stress the quickness of the process- 3 minutes
        iv. Ask if they are Golden residents, if not politely excuse yourself
        v. Read survey to participant, as quickly yet as clearly as possible

D. COMPILE DATA
    1. Software
    2. Assigning values
    3. Timeline
    4. Challenges
E. SURVEY MONKEY
    1. Online venue for survey taking
    2. Included link on cover letter and online outreach
F. CONCLUSIONS, FINDINGS AND RECOMMENDATIONS
    1. Community events return most surveys
    2. Downtown canvassing didn't return many
    3. Missed education of Colorado School of Mines students
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    2. Analysis
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    2. Before and after wastewater analysis metric
    3. Drinking water vs. wastewater comparison
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    3. Partnership with EPA
    4. Partnership with City of Golden

5. Analytical capabilities
6. Development of sampling plan
7. Selection of analytes

C. IMPLEMENTATION
1. Sample collection
2. Sample preservation
3. Sample analysis
4. Results of the chemical analysis
5. Methodology – chemical analysis

D. ANALYSIS
1. Results
2. Conclusions and recommendations

E. FINDINGS/CONCLUSIONS/RECOMMENDATIONS
1. Sample program design and implementation
2. Being on the cutting edge
3. Analytic results
4. Meaning to the CEC project
5. Meaning to the community
6. Next steps
7. Recommendations

F. QUESTIONS FOR CONSIDERATION

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D. POLICY RECOMMENDATIONS
E. FUTURE PLANS FOR EDUCATION
F. REPLICABILITY OF PROJECT

REFERENCES

APPENDICES

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EMERGING CONTAMINANTS: LINKING SCIENCE TO EFFECTIVE ACTION

First Emerging Contaminants Steering Committee Meeting
Wednesday, December 3, 2008, 9:30 – 11:30 a.m.

Council Chambers Room, City Hall
911 10th Street, Golden, Colorado 80401

Proposed AGENDA

1.	Introductions	All
2.	Project Overview	Sara
3.	BHAGs	Carol
4.	Water Sampling / Analysis	Robert
5.	Community Assessment, Evaluation, and Surveys	Sarah
6.	Education and Outreach	Ruth
7.	Funding	Carol
8.	Project Plans / Next Steps Meeting / conference call schedule	All

IES Team
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EMERGING CONTAMINANTS
761 Newport Street • Denver, Colorado • 80220-5554
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EMERGING CONTAMINANTS: LINKING SCIENCE TO EFFECTIVE ACTION

Steering Committee Meeting
Wednesday, February 11, 2009, 9:30 – 11:30 a.m.

Council Chambers Room, City Hall
911 10th Street, Golden, Colorado 80401

Proposed AGENDA

1. Introductions
2. Water Sampling / Analysis
3. Community Assessment, Evaluation, and Surveys
4. Prevention and Mitigation Strategies
5. Education and Outreach
6. Funding
7. Next Steps

Sara Klingenstein, Project Coordinator, Sara@i4es.org

EMERGING CONTAMINANTS
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EMERGING CONTAMINANTS: LINKING SCIENCE TO EFFECTIVE ACTION

Steering Committee Meeting
Wednesday, April 8, 2009, 9:30 – 11:30 a.m.

Council Chambers Room, City Hall
911 10th Street, Golden, Colorado 80401

Proposed AGENDA

1. Prevention and Mitigation Strategy Development
    a. Focus group
    b. Perceived benefits and barriers to behavior changes

2. Survey Update
    a. Test run with Steering Committee
    b. Implementation
    c. Takeback program survey

3. Education and Outreach

4. Water Sampling / Analysis Update

5. Funding

6. Next Steps

Sara Klingenstein, Project Coordinator, Sara@i4es.org

Reminder: EC Project Steering Committee meetings are 9:30 a.m. to 11:30 a.m., at the Council Chambers room in City Hall in Golden, on the second Wednesday every other month:

- June 10
- August 12
- October 14

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Steering Committee Meeting
Wednesday, June 10, 2009, 9:30 – 11:30 a.m.

Council Chambers Room, City Hall
911 10th Street, Golden, Colorado 80401

Proposed AGENDA

1.	Introductions: EC Project interns	Carol, Kristin, Graham, Aviva
2.	Sampling and analysis update / discussion	Thomas, Robert
3.	Focus groups update / discussion	Sarah
4.	Surveys a. Implementation [discussion] b. Pharmaceutical round-up event	Sarah
5.	Prevention and mitigation strategy development	All
6.	Education and outreach campaign a. Community based social marketing b. Identifying barriers and benefits for the EC project c. Plan and approach	All
7.	Funding	All
8.	Next steps	All

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- August 12
- October 14
- December 9

Carol E. Lyons, Executive Director, Carol@i4es.org. Draft - June 3, 2009.