

What to do with Trash in the Tundra



Coastal Villages Summit Meeting
Bethel May 2006

Trash is called “solid waste”. What are solid wastes?

**They are the “leftovers”
from a community’s life**

Solid waste management (SWM) is *how the community*
“takes care” of the leftovers it creates.

Good solid waste management protects the community,
so for Yupiat, **Good SWM protects subsistence...**

**Work on protecting your community and subsistence.
Then you will end up meeting the regulations.**

Traditional Solid Waste Management

Elders tell us that there used to be few “leftovers”. What was not used belonged to the earth. Even “enet” were returned to the earth.



Subsistence wastes still belong to the earth. Good solid waste management is feeding qimugtet with leftovers, or leaving leftovers away from town.

Elders already know good solid waste management. Some of the SWM planning they have taught:

- Not leaving fish nets in and wasting fish and polluting the river.
- Being careful with gasoline and oil when using motors and chain saws for ice fishing.
- Helping each other cleanup.
- Volunteering in keeping campsites and towns clean.
- Bringing litter into town to the dump site.
- Not wasting food, not using so many throwaways, like plastics, Styrofoam, diapers.

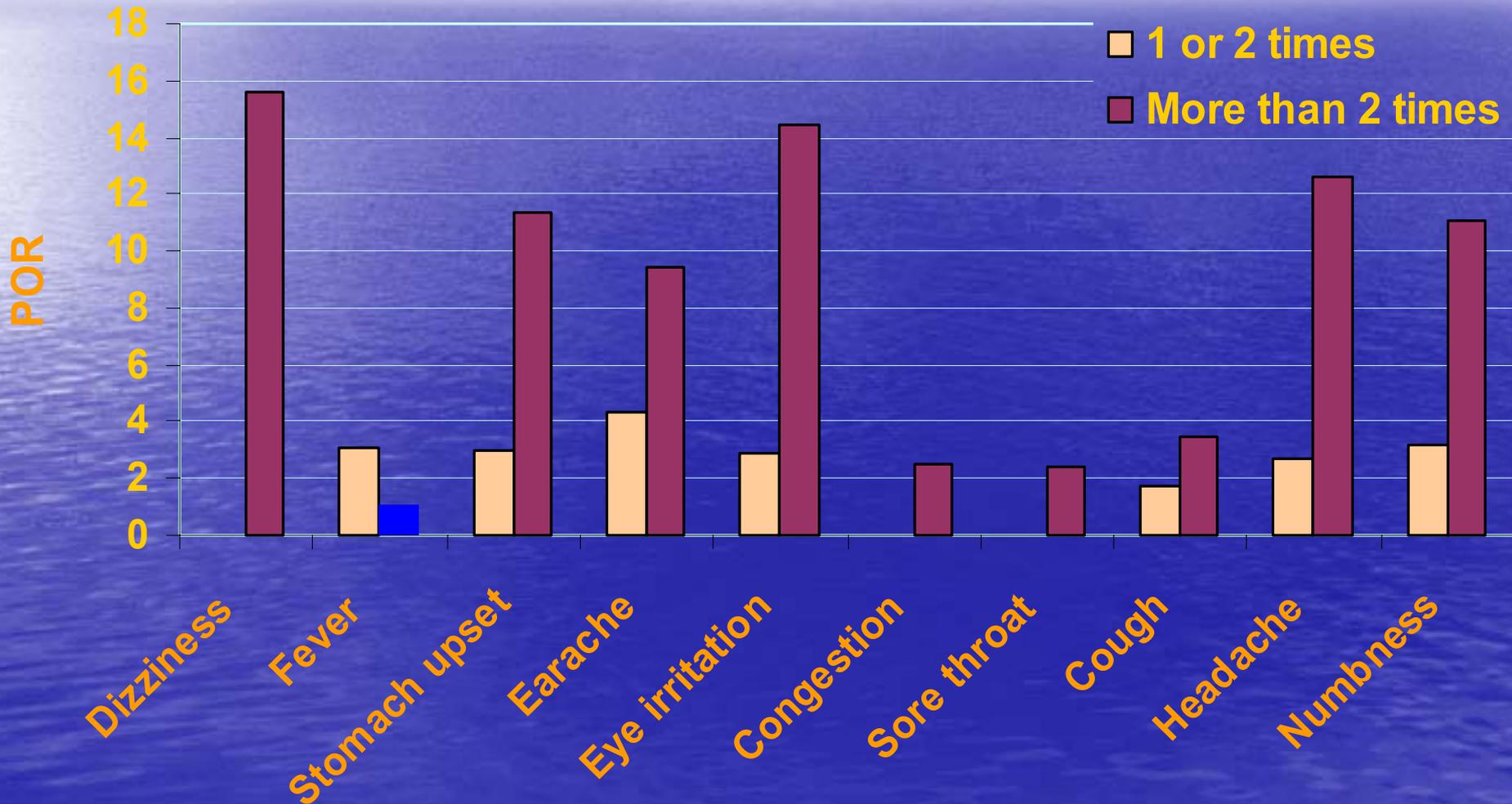
More Good SWM Elders have taught:

- Bringing your own dishes and cups to meetings and celebrations.
- Teaching youth in an encouraging manner. Not humiliating them. Teaching them the old ways.
- Encourage subsistence activities. It is healthier and makes less throw-away packaging.
- And a lot more....

Why we are here: Relative risk of symptoms related to waste disposal factors in four Alaska Native Villages, 2001.

| Symptom | % Affected | Live near dump | Dump smoke or odor concerns | Burns near home | Visits dump |
|----------------|------------|----------------|-----------------------------|--------------------------------|-------------|
| Rash | 7.2 | ----- | 2.3 | 29.7 | 2.9 |
| Faintness | 3.6 | 4 | 6.3 | 5.4, 13.2, 17.4 frequency ↗ | 3.5 |
| Fever | 8.7 | ----- | 1.7 | 2.3 | 2.0 |
| Stomach pain | 10.3 | ----- | 2.2 | ----- | 3.0 |
| Vomiting | 2.6 | ----- | 1.6 | ----- | 3.6 |
| Diarrhea | 5.2 | ----- | 1.5 | ----- | ----- |
| Ear irritation | 4.4 | ----- | 5.5 | ----- | 2.1 |
| Eye irritation | 5.9 | 18.9 | 2.3 | ----- | 3.7 |
| Congestion | 19.4 | ----- | 1.8 | ----- | 1.4 |
| Sore throat | 14.1 | ----- | 1.8 | 2.0 | 1.6 |
| Cough | 18.4 | ----- | 1.5 | 1.9 | 1.7 |
| Headache | 14.1 | 2.9 | 2.0 | ----- | 3.0 |
| Numbness | 3.5 | ----- | 2.6 | 4.8, 5.2, 10.1 frequency ↗ | 3.4 |

Visits to Dumpsites



Birth Outcomes Study

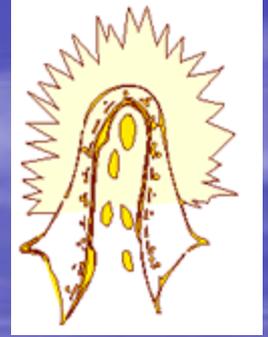
- A study was performed using birth records from 1997 – 2001 from mothers who resided in 197 Villages, together with dumpsite rankings.
- ✓ **Infants weighed on average 36 grams less** when born to mothers from the high exposure group than infants in the intermediate exposure group and 55.4g less than infants in the low exposure group.
- ✓ On average, **pregnancies lasted 1.2 days less** in mothers from high hazard potential Villages than pregnancies in the intermediate hazard ranked Villages.
- ✓ **Infants** born to mothers residing in Villages with **high hazard dumpsite contents** were **4.3 times more likely to have “other defects” than other infants.**
- ✓ Additionally, **positive odds ratios** for all congenital anomalies, central nervous system anomalies, circulatory and respiratory anomalies, urogenital anomalies, musculoskeletal and integumental anomalies, multiple anomalies were found. The estimates were similar to significant associations found in other birth defect studies on maternal populations living near open dump sites in developing countries, **indicating that associations in Alaska Villages with these birth defect categories could be significant with a higher population size or greater exposure detail.**
- ✓ *See handout for where to find more detailed information on this study.*

Types of Solid Waste

These are all solid wastes. Which ones are in your community?

| | |
|---|--|
|  | Food wastes |
|  | Paper & Cardboard |
|  | Plastics |
|  | Textiles |
|  | "Yard" wastes and wood |
|  | Glass |
|  | Tin cans, aluminum, and other metals |
|  | Special wastes (furniture, electronics, large appliances, household batteries, etc.) |
|  | "Hazardous wastes", EPA defined |
|  | Mining, Logging, Cannery wastes |

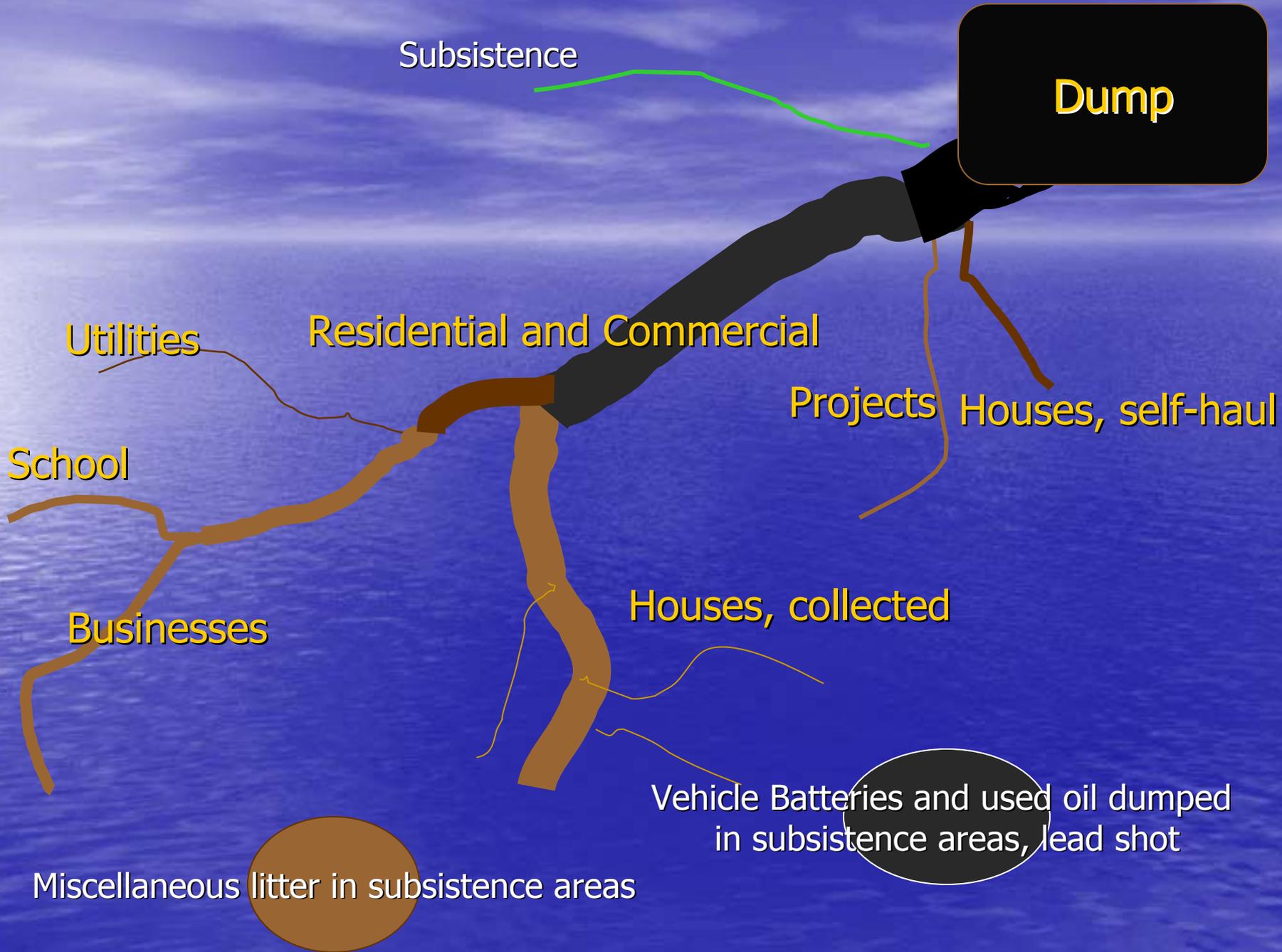
In an "Integrated SWM plan", you decide where all of these wastes belong for your community.



What is a Wastestream?

A waste stream is like a kuik - a water stream , but made up of wastes, instead of water.

- ❖ The wastes go in one direction only.
- ❖ Each waste starts from one place.
- ❖ By the time the wastes arrive at the dump, they are with lots of other wastes - just like a kwik can get bigger and bigger when the small streams join together.



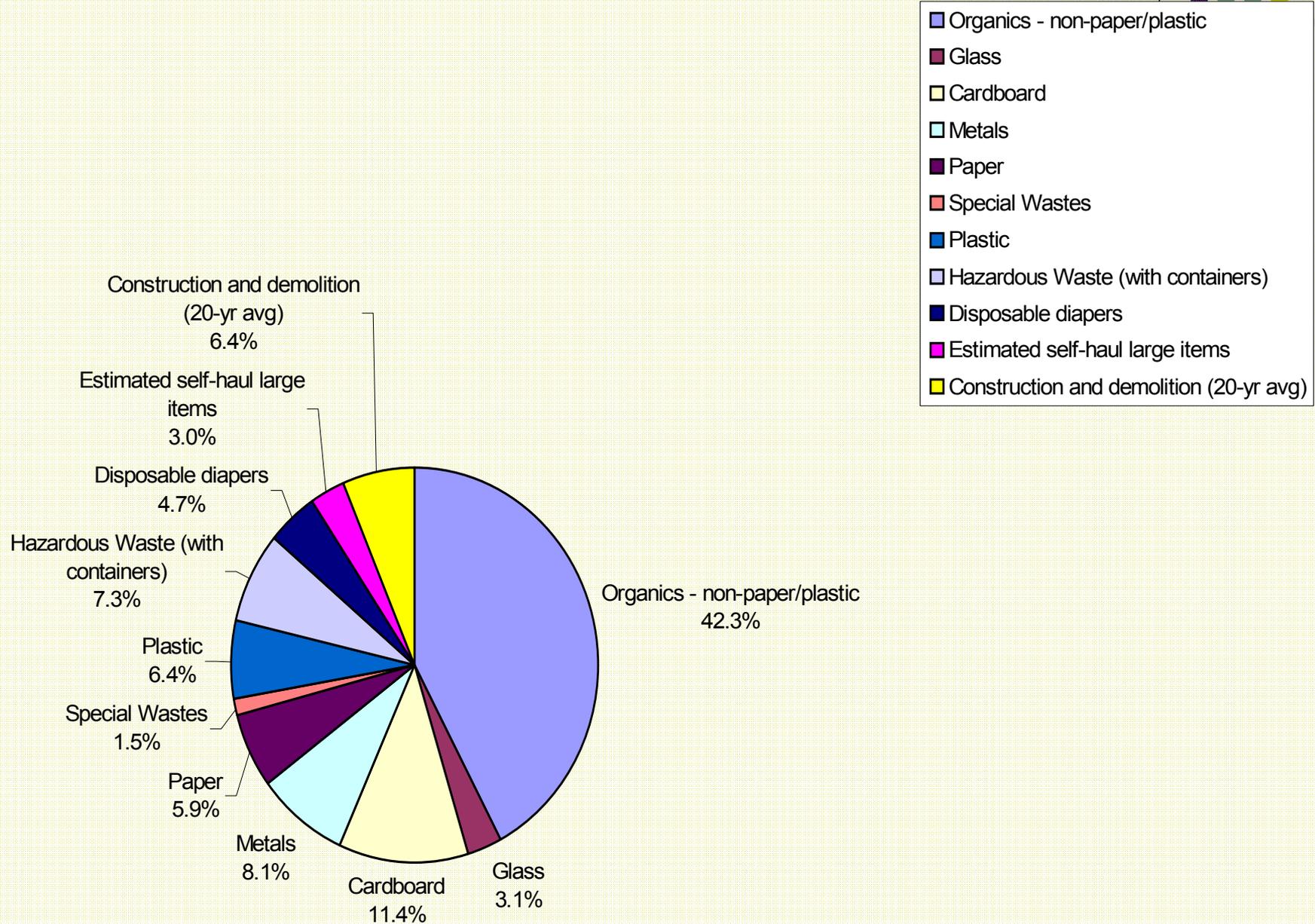
Wastestream: Just like the waterways and trails, your wastestream must be learned well to live well.

**How much of each kind of waste do you have?
Where does it start? What wastestreams are most
important to work on? Which wastestream can be
made smaller or less hazardous?**

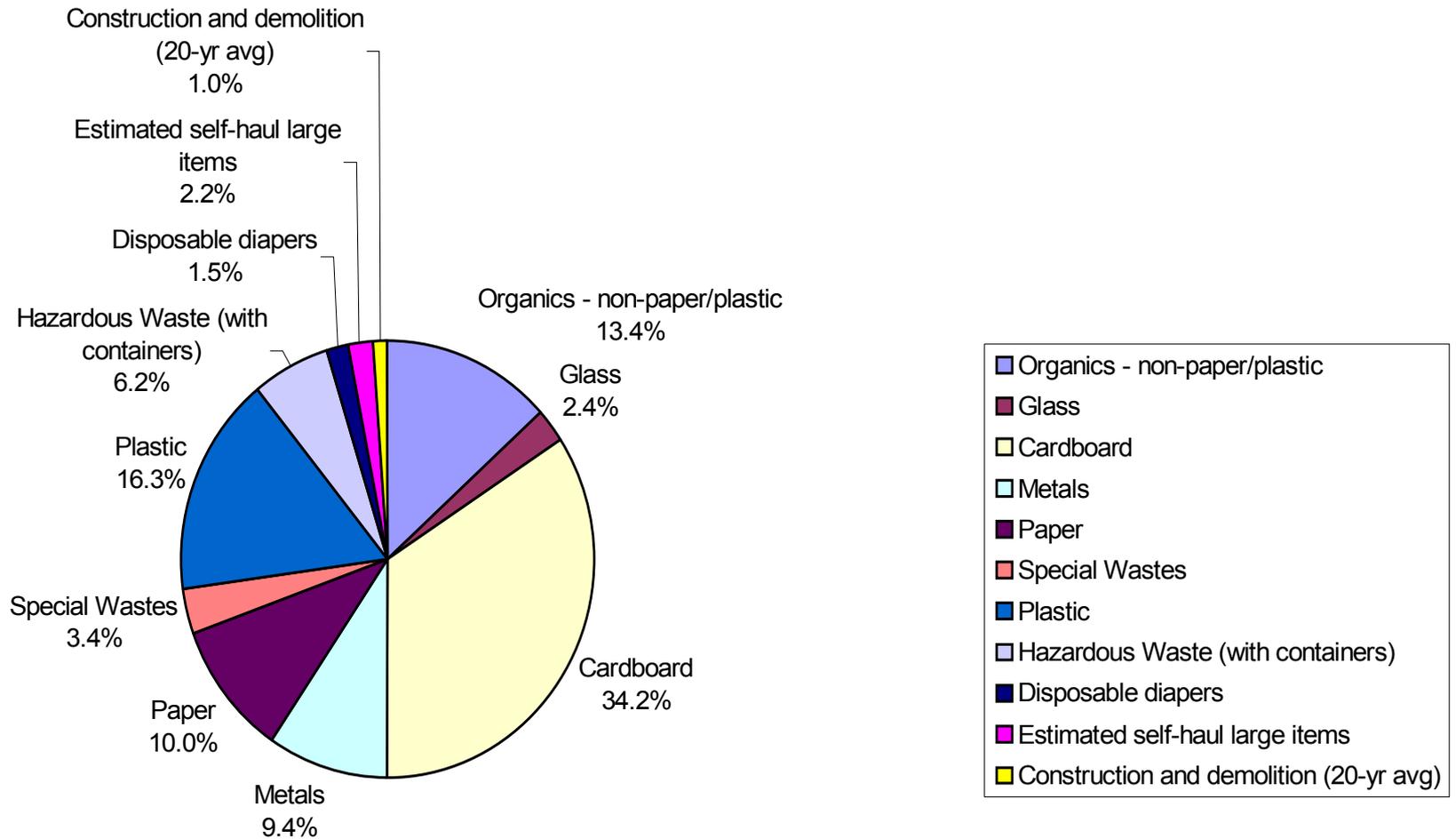
Learning your wastestream is called a “wastestream analysis”. Some people say “waste assessment” or “waste characterization”.

Your handouts have information on where to get information to perform an analysis.

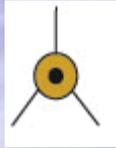
Wastestream analysis in SW Alaska Village, by Weight



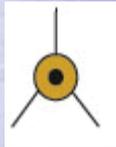
Wastestream analysis in SW Alaska Village, by Volume



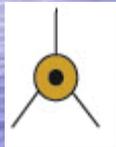
Where does each type of leftover belong? How can the wastestreams be managed?



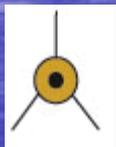
Do they belong at a dump salvage area?



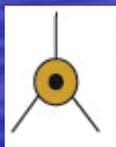
Do they belong in a hazardous hazardous waste "share shed"?



Do they belong in a burnbox?



Do they belong on the ground, away from town, for the animals and birds to eat?



Do they belong in Bethel, Napa Auto, Recycling Center, or on the barge to be recycled in Seattle?



Planning Process

Try to stay here, always checking, learning, improving.

Perfect SWM Plan

that is acted on!! It is not possible. Environment, technology, \$\$, backhaul chances—they all will change. The best plan for your community will be different in 5 - 20 years

Communities

No Plan, no action

Community concerned, **then** organizes to identify concerns

Capacity building of staff, respond to identified concerns

Plan is formed & **acted on.** Slowly, it will include actions that address **all** wastes.

Community uses plan to follow good practices, and to get \$\$ for things like buying equipment



Re-doing, re-planning. With big changes, a big step back might be necessary. But with a concerned community and trained environmental staff, you will never get back to the worst place - no plan, no action.

Waste Properties

There are all kinds of solid wastes. Each has **different properties** that can make a difference about what to do with it. When you are deciding what to do with each waste type, Ask yourself:

1. What makes this waste different?
2. What does this difference tell me about what I can do with this waste?
3. What does the difference tell me about the **Priority** in doing something about it?



There are 3 main waste properties to think about in determining priority for health and subsistence.

- **Volume:** Volume affects the amount of space for the dump. Can you keep the volume from spreading into the river or flooding areas? What wastes make the most volume? **Degrades?:** Look at waste volume over time. Cardboard and paper and food slowly will disappear, (or can be burned quickly).
- **Weight:** Weight affects how much it will cost to backhaul the waste. And whether heavy equipment is needed to move it. **Size:** Is it harmless and small? Keep it there. Is it harmful or big? Keep it out by using project contracts, or backhaul it to Bethel.
- **Hazardous:** How hazardous a waste is will affect subsistence and health. **Amount?:** Small amounts of hazardous are okay. Large amounts are not. **Degree?:** A small amount of very hazardous waste can be as bad as a large amount of slightly hazardous. **Degrade?:** A waste that breaks down slowly gives the environment time to absorb it. **Exposure?:** If people and animals are not exposed, it won't matter if the waste is hazardous. Can you store it instead of burn or dispose it?
- **(#4)Revenue:** Can I make money to help pay for the collection service or more backhaul? (Aluminum, copper pipes, ink cartridges)

Hazardous Wastes

The EPA calls a waste a “hazardous waste” if it is either:



Flammable/Combustible/Ignitable: Can be easily set on fire.
Examples: Gasoline, kerosene, alcohol, oil



Explosive/Reactive: Can detonate or explode through exposure to heat, sudden shock, or pressure.
Examples: Chlorine, drain cleaner



Corrosive: Chemical action can burn and destroy living tissues or other materials when brought in contact.
Examples: Acid from lead-acid batteries



Toxic: Capable of causing injury or death through ingestion, inhalation or skin absorption. Some toxic substances cause cancer, genetic mutations and fetal harm. The amount plus the length of time exposed equals “the dose”, and whether animals can be harmed. Examples: Pesticides, lead, mercury, dioxins, ethylene glycol, oil.

For projects, contractors are supposed to take out “hazardous wastes”. But in Village Dumps, other wastes can become hazardous if they are burned – even in a well-made burnbox. If you don’t want these project wastes in your dump, write it into the contract.



Paper isn’t called a “hazardous waste”, but when it is burned the smoke can affect air quality and ash can settle in water. Magazines and color advertisements contain “heavy metal” inks. Get rid of junk mail to reduce your volume and hazards. See your handout.



Plastic isn’t called a “hazardous waste” but burning it can cause bad chemicals to go into the water and air.



Carpets and pans and clothes aren’t hazardous wastes, but burning even these can release hazardous chemicals in the air, as they contain sealants and flame retardants.



Burning Wastes



Burning is really good for reducing the size of the dump. You can separate out the safer waste to burn – like paper, cardboard, and food. Then landfill or recycle the rest. That way you get the good parts of burning without the bad. Like managing anything, when you decide to manage wastes, you have to make choices about what you want. More work, but safer health.

You can burn your wastes with different kinds of equipment. Unfortunately, the safer the smoke and the more complete the burn, the more money it costs to buy and maintain.

Open Burning: A burn trench at the dump – under State law this type of burning will be illegal by July 2006

Burnbox/burncage (\$): A metal tank or cage with a vent system

Air controlled system (\$\$): A controlled chamber with filters.

"Incinerator"(\$\$\$): A "high tech" chamber(s) with excellent air cleaning. The O & M can cost \$100/house/month due to fuel.



What can burnboxes look like?

This is the kind that Chefornak has, and Nightmute is getting. One of the bad things about burning—You are left with the ash. To empty the ash, people tilt this burnbox with a Bobcat. But smaller burnboxes can be made with a long handle to tilt by hand, or you can shovel the ash out.



Photo source: Tok Welding

A cage-type burnbox can be made to push the ash out with a dozer, a more convenient method if you have the equipment.



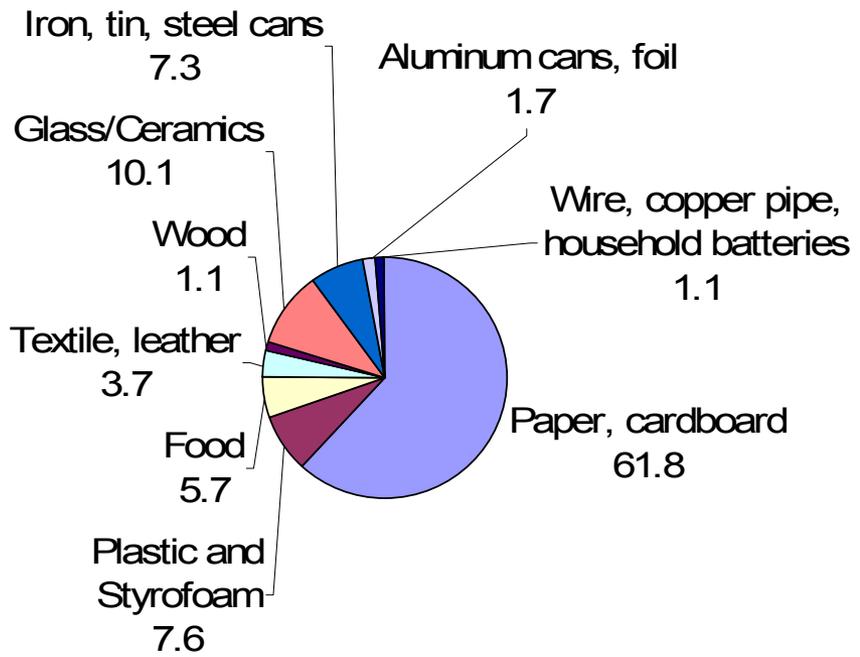
Both types, and many other designs, can be **made locally** with local materials. They may not last as long, but if made with good draft, **they will produce similar emissions**, are **much cheaper**, and they employ **local labor**. ANTHC has designs available, or ask other villages.

See handout for additional information.



A detailed study was done by EPA on "open burning". So far, it is the only one with high detail. They used a burnbarrel that was designed for maximum venting (a design available through SWAN). They burned only regular household trash, from a lower-48 city. The waste composition and amount is different from Alaska Villages, but not extremely different. So the chemicals found in the emissions would be likely similar to those from a burnbox. The amount of chemical could be expected to be around the same order of magnitude (i.e. similar size of the number, but not the same number) .

Household trash burning study, waste composition by percent weight



Types of chemicals from burning of regular trash at **1400F** in a burn barrel with well-designed puncture holes and wire mesh on top, with good draft properties. Numbers given equivalent to Village of 400 people.

| Compound | mg/village/d |
|-------------------------------|---------------------|
| benzene | 298,300 |
| acetone | 226,200 |
| styrene | 178,000 |
| total VOCs (tentative) | 3,464,500 |
| naphthalene | 11,500 |
| phenol | 33,700 |
| dichlorobenzenes | 38,500 |
| trichlorobenzenes | 26,500 |
| tetrachlorobenzenes | 17,800 |
| pentachlorobenzene | 12,800 |
| hexachlorobenzene | 5,300 |

| Compound | mg/village/d |
|--------------------------------|---------------------|
| acenaphthylene | 2,600 |
| naphthalenec | 4,300 |
| phenanthrene | 1,800 |
| aldehydes & ketones | 673,700 |
| total dioxins | 9 |
| total furans | 2 |
| total PCBs | 687 |
| PM10 | 4,571,200 |
| PM2.5 | 4,200 |
| HCl | 68,200 |
| HCN | 112,600 |

What are “Heavy Metals” Versus “Big Metals” ?

- “Heavy Metals” are not big metal wastes like vehicles or 55-gal drums or refrigerators. A “heavy metal” is a scientific term for **metal chemicals**. When metal is in its chemical form it is easy to inhale, eat, or absorb. If this happens, most heavy metals are dangerous. But metals like **lead, mercury, and cadmium** are very dangerous to fish and people, even in small amounts.
- **Scrap metal** and “white goods” are mostly iron, copper tubing, aluminum, etc. This type of metal is **not harmful** to fish and people **when left at the dump**. It is okay to have junked vehicles and metal at your dump. In most cases, **metal does not travel through soil very well**. It binds to soil and tundra and is taken up by plants. And **it takes a very long time for big metal to degrade**. You can work on a backhaul plan slowly for big metal wastes.
- To make scrap/vehicle metal “safe”, just **remove the fluids, battery, freon (if any) and mercury switches and sensors**. With the small volume and weight, you can backhaul out what you removed, or store it. *See the mercury removal manual referred to in your handout.*

EPA 2006 Aquatic Life and Consumption Tables

| | Freshwater | | Saltwater | | Human consumption of | |
|----------------------------------|--------------------------|----------------------------|--------------------------|--------------------------|--------------------------|----------------------------|
| | CMC (acute) (µg/L) | CCC (chronic) (µg/L) | CMC (acute) (µg/L) | CMC (acute) (µg/L) | CMC (acute) (µg/L) | Organism Only (µg/L) |
| Arsenic | 340 | 150 | 69 | 36 | 0.018 | 0.14 |
| Beryllium | | | | | | |
| Cadmium | 2.0 | 0.25 | 40 | 8.8 | | |
| Chromium (III) | 570 | 74 | | | | |
| Chromium (VI) | 16 | 11 | 1,100 | 50 | | |
| Copper | 13 | 9.0 | 4.8 | 3.1 | 1,300 | |
| Lead | 65 | 2.5 | 210 | 8.1 | | |
| Mercury Methylmercury | 1.4 | 0.77 | 1.8 | 0.94 | | 0.3 mg/kg |
| Nickel | 470 | 52 | 74 | 8.2 | 610 | 4,600 |
| Cyanide | 22 | 5.2 | 1 | 1 | 140 | 140 |

Non-Priority Pollutant:

| | | | |
|--------------------------------|-----|----|--|
| Aluminum at pH of 6.5 - 9.0 | 750 | 87 | |
|--------------------------------|-----|----|--|

Lead, Mercury and Cadmium are the most common heavy metals in landfills, by far. We would expect the same to be true for Village dumps. The percent of lead in Village dumps may be higher than national averages because vehicle batteries are not recycled very much here.

Table 1. Tonnage Estimates for
Three Heavy Metals Disposed in US
MSW Landfills in 2000

| Heavy Metal | Tons/Year | Percent |
|-------------|-----------|---------|
| Lead | 127,108 | 97.6 |
| Cadmium | 2,680 | 2.1 |
| Mercury | 383 | 0.3 |
| Total | 130,171 | 100.0 |

Where does lead, mercury, and cadmium come from and how do we get rid of it?

- Some freezers, stoves, thermostats, and cars have **Mercury** switches or sensors. This is likely the biggest source of mercury at the dump. You can **remove this risk by removing the switches**. Also, old clinic equipment can contain a lot of mercury. Make sure your clinic backhauls all of its blood pressure cuffs, thermometers, batteries, etc. when they are replaced. Button cell batteries and fluorescent lights contain mercury too. These are easy to collect and backhaul.
- **Lead** comes mostly from vehicle batteries (“lead-acid batteries”). A community of 400 people can make close to 2,000 to 4,000 pounds of lead each year from this source. Computers contain a lot of lead. “Picture tubes” in TVs also contain lead. These sources are important, but there are not nearly as many discarded (yet), they don’t contain as much lead, and they do not contain their own supply of acid. **Backhaul your batteries.**
- **Cadmium**, and many other harmful heavy metals are in computers and other electronic goods. **Computers must be stored until they are backhauled. Don’t burn electronic items, including household batteries. Backhaul or recycle them.** Educate kids about electronic games. Try to reduce use. **Work with the school** so that they backhaul their computers on their charter flights and barges.
- See your handout for information on getting rid of these wastes.

Subsistence and traditions - at risk from waste?

Our health study found that about **79 percent** of residents in a YK Delta Village were changing their subsistence practices because they were concerned about pollution from dumps and from the litter at camps.

But subsistence actually protects people from ill health associated with open dumps:

Symptom **Eating subsistence foods most of the time (more than 50% of time) decreased the likelihood of having the symptom by this much:**

fever ***2.3 times***

**stomach
pain** ***1.5 times***

vomiting ***3.4 times***

cough ***1.6 times***

Protecting Subsistence Rule #1

- **Get the lead out.** Lead causes brain problems including ability to move and think. It is especially harmful to children. Count how many vehicle batteries are discarded in your community each year and make sure that every single one gets stored, or shipped out to Bethel or Anchorage. See handout.
- **Why are vehicle batteries more important to work on than electronic goods or most other wastes? Because we discard a lot of them, they are almost all lead, and they contain acid.** The acid makes the lead go through the soil and water.
- **Lead in soil.** All children need to do is play in an area where lead is in the soil. They will get lead into their bodies, and it can harm them. Never let children play at the dump and never discard batteries on the ground in town.
- **Lead shot and sinkers.** A solid waste? Look for pollution prevention, IGAP, Tribal lead, Conservation grants for subsidizing steel shot and sinker programs. See handout for more info.

Subsistence protection Rule #2:

- Don't burn anything that contains mercury or lead or cadmium. This means never burn batteries, electronic goods, or fluorescent lamps. **Burning is the most certain way to harm the community and fish and other foods.** The heavy metals will go into the air and settle into water and be breathed by people and animals. Without burning, the metals may never get beyond the dump buffer.
- With burnboxes that are easy for residents to throw in their wastes, the risk of vehicle batteries and electronics being “heaved in” is higher. Education is extremely important, as is **prohibiting or controlling self-haulers, so they are in only one area of the dump.**
- **Batteries and electronic goods and fluorescent bulbs are easy to separate out.** They are pretty easy to backhaul for free or little cost. They can be stored until then. Household batteries are free to recycle. Look at your handouts for more information.
- If households can't separate them before they go to the dump, then **provide a Connex or other container at the dump for these items.**

Protecting Subsistence Rule #3

Take care of your used oil. Don't discard or leak oil anywhere near water. **1 gallon contaminates one million gallons** of drinking water. Used oil contains heavy metals, and cancer-causing chemicals. It is very important to provide residents a place to bring their used oil, and to encourage maintenance of vehicles so that they don't leak. Purchase a used oil burner to heat buildings or buy a used oil blender that cleans and recycles the oil to new fuel.

See handout.

Protecting Subsistence Rule #4

- Educate households and stores about their **hazardous wastes**. Most household products that contain dangerous chemicals are not necessary. Read the labels. There are alternatives. Baking soda and vinegar can clean almost anything. See handout to find out some alternatives.
- **Set up a “share shed”** so that the unused products can be used up by someone else. See handout to view examples.
- With a shed and education, **there is no reason for household hazardous wastes to end up at the dump**. Your homes will be safer too.
- Convince your store and community to **buy glass and aluminum instead of plastic bottles and containers**. Only order plastic bottles with #1 and #2. These can be recycled in Bethel now.

Protecting Subsistence

Rule #5



- **Use nature as a guide.** Keep a **buffer zone of plants** between your dump and river or subsistence areas. Plants, especially grasses and reeds, but also moss, will take out a lot of contaminants through filtering and uptaking them. Moss retains a lot of water and allows time for the metals to settle.
- **Soil can hold metals and many contaminants**, as well as filter the leachate before it drains through the water. Some soil properties are better than others. Soil pH between 6 and 9, high organic content, and more clay, less sand are all helpful in keeping metals at or close to the dump. You can get your soil tested through UAF Ag. Ext. Service.
- **Disturbance of the plants and soils** (like ATV trails, permafrost melt, *turbulent* flooding, and digging) **can release heavy metals** and other contaminants so that they are free to go into the water or move further away from the dump.
- **Animals and birds that might occasionally contact the dump are okay to eat and handle.** You go to the dump, and they are getting exposed to the same things. Like any animal, it is just best to use alcohol sanitizer or water and soap to wash off after prepping, and before contact with other parts/members of your household, or your mouth, nose, or eyes.

- If animals **live** at the dump, it is probably wise to be cautious and not to hunt them. Birds lighting on honeybucket dumps or regular dumps (i.e. diapers) can carry harmful bacteria on their feet. Just like humans, they can track it into town where they land. That is why it is best to not throw food away, or burn it quickly, so animals aren't attracted. Diapers should be well-wrapped (if they are used).
- If "dump birds" land on your rain water roof catchment system, they could be a source of bacterial or viral contamination, just as much as dipping a hand in the barrel. If you get a lot of birds on the roof, disinfect the water by boiling it, using chorine tablets, or other means (UAF is researching some easy, low-cost alternatives).
- **Berry picking near the dump.** From what we know, occasional eating of berries near the dump should be fine. It is best to go further away for more frequent picking, at least 400 yards away. A preliminary sampling study showed decreased levels of bacteria and used oil and lead as the soil samples got further away from several dumps, and near or at background levels within a few hundred yards.
- However, go even further away if you can, especially if you are downstream (or downwind) from the dump and there are no plants in-between, for your regular berry picking, or if you eat a lot of berries throughout the year. **We do know that washing off berries and other plant (and animal) foods will remove at least some contaminants if they are present,** and should always be done anyway, especially if you use DEET. Eating some while picking should not be harmful because it is only done for a short time each year.

Protecting Subsistence Rule #6

- **Treat your burnbox like a hazard.** Burnboxes emit toxic smoke. *All* of them. Smoke settles and pollutes. Make sure your town and subsistence grounds are as far away as possible, not downwind, and **reduce the hazardous wastes (including plastics)** as well as the total volume of wastes (including paper) as much as possible.
- For resident health, **keep people far away from burning burnboxes**, especially those that emit smoke at face level. **Make your operator wear an approved mask.**



- There have not been any completed detailed studies on Alaska burnbox or Village open dump smoke yet. But very high breathing of smoke particulates and gaseous toxics has been shown to be connected with...

- Increased deaths

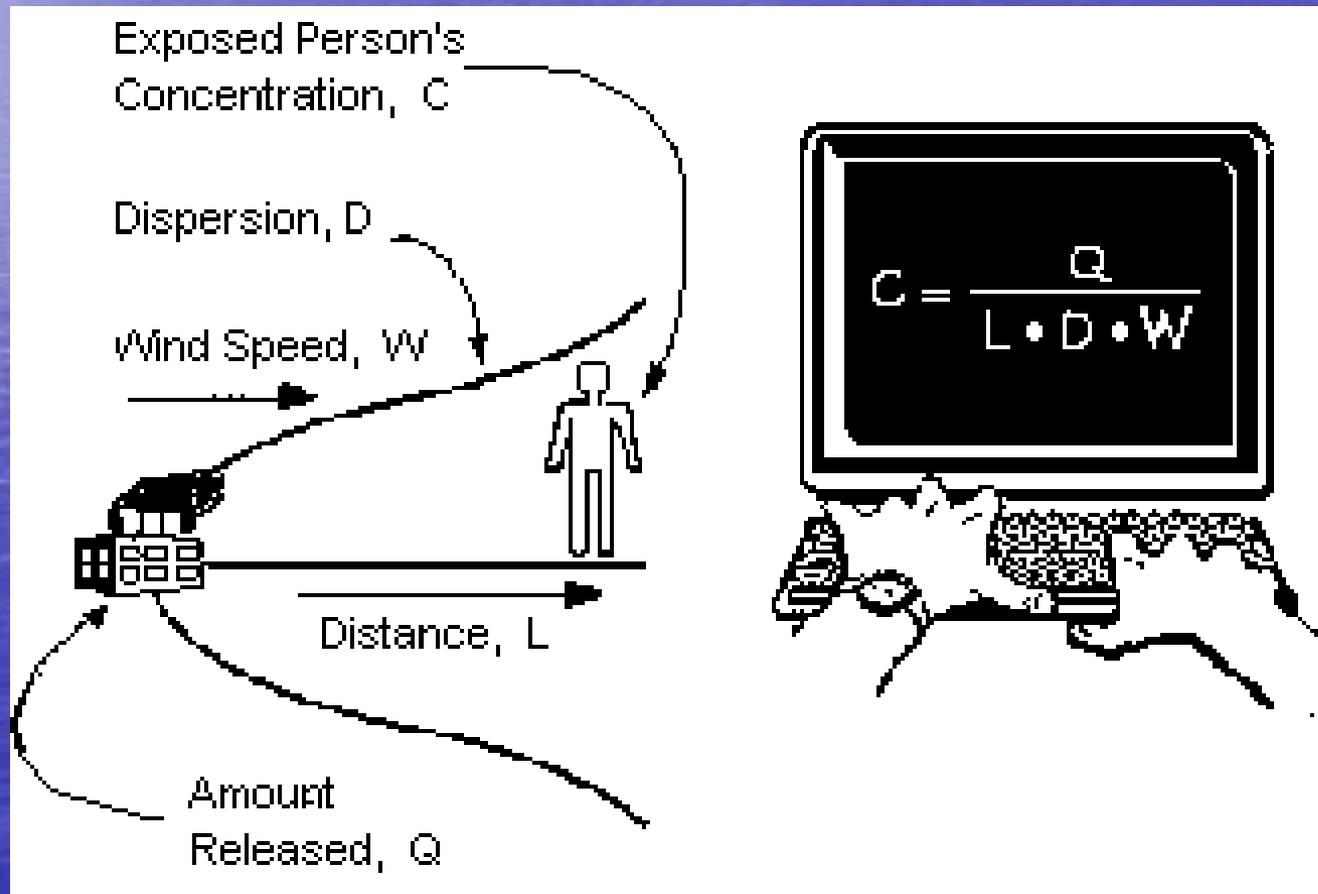
- Cancer

- Hospitalization

- Functional Limitation, and

- Physiological impairment (like asthma).

Simple Model of Exposure Factors: Note, the higher the "hazard" of a chemical, the lower the concentration (C) needs to be for bad effects. Also, chemicals breakdown differently once they enter the body. Some get more toxic, others less toxic, and some are eliminated without being absorbed. Also, animal and birds have different tolerances. Birds have very sensitive respiratory systems.



What is a safe distance for homes and subsistence grounds?

We don't know yet. We do know that people living less than 1/2 mile from burning dumps *can* (but don't always) experience at least short-term health risks. And based on one burning study, assuming *little wind* and *daily burning*, homes should be at least 1/3rd to 1/2 mile away for residents to avoid breathing more particulate matter than recommended.

If it is really easy to smell the dump (a strong smell), and the smoke or odors are smelled most days, then the homes are too close. If it is possible, *don't burn*. If your wastes will overflow into your waterways, *then try to burn mostly paper and cardboard and food wastes*. If you don't have the land or compacting equipment to *not* burn, work with EPA or DEC and find funding for an alternative asap. You have a good reason to get funded if you can state your situation clearly. Reduce waste volume and toxics as much as you can in the meantime.

If you can't stop burning,

Stop or reduce the smoke connections:

- ❖ Breathing it (usually greatest risk)
- ❖ Absorbing chemicals through skin
- ❖ Eating it (by eating settled/adsorbed ash and smoke on hanging fish, or children ingesting dirt, smoke blowing over berry grounds, etc.) Occasional or light smoke/ash is okay. Heavy and regular may not be.
- ❖ Drinking it (by drinking settled or absorbed ash/smoke in water right after or during a burn nearby)



If these connections don't happen, your community won't suffer the health effects.

Smoke connections (exposures) to break.

- Keep the burning out of the Village. Don't allow (or limit) home barrel burning.

- Keep burn hours at the dump when the public won't come.



- Consider burning during low-activity hours when children are not playing outside, such as night.



- Burn downwind of the Village.



- Make the smoke exposure shorter **by reducing your waste volume.** Reuse, repair, recycle, and refuse packaging and plastics.

- **Move the burnbox further away** from people and subsistence grounds. This will dilute the smoke by the time it reaches people's and animals lungs, or settles onto berries or drying racks.



- **Make the smoke emissions less toxic by using a burnbox instead of ground/trench burning.** Any burnbox with good venting will work. It doesn't matter if it is local-made or pre-made. As far as we know, emissions are about the same.



- Residents should not come to the dump during a burn. But if they do, **keep them at least 100 ft from the burnbox, and don't let them stay long.** Watch out for smoke that comes out at face level. High stacks can dilute the smoke before someone breathes it.



- **Separate out hazardous wastes, electronic wastes, and plastics.** Remember every waste separated is less chemicals to the environment.

Styrofoam

Health Protection - Exposure, Exposure, Exposure.

Do your waste disposal practices prevent exposure?
If not, there are many ways that poor health can happen:



Accidental contact with **medical wastes** from the clinic or homes. This includes band-aids, Kleenex, gauze.



Breathing problems from **smoke inhalation**. Burnboxes still make toxic smoke. The smoke is safer than smoke from less hot fires. But to be fully safe, the smoke should not be noticeable to smell in town or at subsistence areas .



Long-or short-term **illness from toxic fumes**, including smoke from dump fires, home burn-barrels, and burnboxes.



Animal-borne disease carried by insects, pet dog carcasses, and animal dump site scavengers.



Food-borne disease from germs in people's leftovers and wrappings.



Disease from **germs in honeybucket** wastes and liners. Tracking on boots and tires was proven by a UAF study.

Reduce / Refuse Wastes: An important choice to make is how much you want to reduce, or “refuse” your wastes.

- ❖ Many Villages have stopped using plastic bags. A few have banned Styrofoam.
- ❖ Eating more subsistence foods reduces paper and cardboard wastes.
- ❖ Buying foods “in bulk” instead of single or small servings reduces plastics and paper.
- ❖ Working with the stores to order only aluminum cans or glass bottles and jars. It reduces plastics – an important way to reduce your hazards.



Recycle and Reuse Wastes: Camai-i to Bethel's recycling expert:

- Kituuga?
- Bill Burnard, Bethel Recycling Center Manager
- Recycling Center c/o Public Works
- P.O. Box 1388 Bethel, AK 99559
- Phone: 543-7072
- Call him if you want to start recycling cans, plastic bottles, cardboard, batteries, computers. He will take it all for free and pay you for the cans. The cans and copper pipes also help him pay for shipping out your computers to Anchorage, and for gas to pick up what you send him on the planes.

Recycle and Reuse Wastes



Recycling, reusing, or repairing wastes are another good way to reduce your wastes. Many Villages do this with aluminum cans, lead acid batteries. Fluorescent light bulbs, household batteries, inkjet cartridges, and computers are all wastes that can be easily recycled from this area. They are also wastes that will keep toxic chemicals out of the dump and camps. IGAP will pay for the pre-paid boxes that you need.



Reuse wastes in-home



“Materials Exchange”



Reuse in-community



Mail wastes in pre-paid boxes, or free envelopes



Haul wastes to a “Buy-back”, like Bethel Recycling. Or a “Take-back” like Napa Auto



“Share shed” for Household hazardous items

Quyana!

Do you have questions?

Try the SWAN network at www.ccthita-swan.org
and

There are additional solid waste materials developed by
Zender Environmental and Institute of Tribal
Environmental Professionals (ITEP)
on www.zender-engr.net

Or contact me:

Lynn Zender

lzender@zender-engr.net

(907) 277-2111