How Many Batteries Are Generated Each Year in Our Village:

				Column Numbers					
#1	#2	#3	#4	#5	#6	#7	#8	#9	#10
Source	Type	How many for each household or office/store?	Total number of vehicles with batteries	Battery lifetime (years)	Number generated each year for disposal	Estimated undrained weight of one battery	Estimated undrained weight of all batteries	Estimated lead in each unit (lbs)	Total lead each year disposed (lbs)
Number of Households:	Snowmachines			3		12		7.5	
	ATVs			3		12		7.5	
	Boats (Marine/RV)			2		45		30	
	Cars, Light Trucks			4		30		18	
	Heavy Trucks			3		60		35	
Number of Offices, Stores, Other:									
	ATVs			3		12		7.5	
	Snowmachines			3		12		8	
	Cars, Light Trucks			4		30		18	
	Heavy-duty Trucks			3		60		35	
	Boats (Marine/RV)			3		54		32	
	Small Heavy Equipment			2		45		32	
	Planes			2		68		40	
Total each year:			Total number in vehicles		Total batteries for recycling each year	Total weight in pounds			Total pounds of lead each year

Steps to counting your batteries
and tracking your battery recycling participation rate

1. Fill in the number of **lived-in** households in your Village in **Column #1**. If you don't know, divide your Village population by 4 as an estimate. For example, if you have 200 people in your village, you might have 20÷4 = about 50 households.

2. Fill in the **total number of stores and offices for your Village**. These include the Tribal and City offices, Post Office, AVEC, the school. Include all the entities that have at least one vehicle. If you are a larger community, you might have some special operations that have a lot of vehicles. A special operation might be a commercial harbor, an industry, a USFWS station, or City Public Works. Don't include those yet. You can count them later.

3. Write into **Column # 3** the *average* **number of each vehicle** for households and offices/stores in your village. You don't need to be exact. Just do the best you can. Here are some examples:

> **If** most households in your Village own 2 to 3 snowmachines, but there are a few households with just 1 or zero,
>
> **Then** the average number would be: About **2**.
>
> **If** only about half of the households own ATV's,
>
> **Then** the average number would be: About **one-half**, which equals **0.5**, *or* **50%**
>
> **If** only about 5 households in town own trucks, and your have 50 households,
>
> **Then** the average number of trucks is:
> 5 truck households ÷ 50 total households = **0.1**, (= one-tenth, or **10%**)
>
> **If** some households own 1 boat and some households own 2 boats,
>
> **Then** the average number of boats would be:
> About halfway between 1 and 2, or about **1 & one-half** boats each (= **1.5** ,or 150%).

4. Count the average number of vehicles for your offices, stores, businesses, etc. and fill the number in for **Column #3**. For example, do most businesses own an atv and snowmachine? Then the average would be 1 for each type. If only 2 businesses own trucks, and you have 8 total businesses/offices, then the average number of trucks would be 8 ÷2 = **0.25 = 25%**. Don't worry too much about being exact. Because there

are usually way less business vehicles than household vehicles, your battery characterization will still be a good estimate.

5. **Are you getting a headache from Column # 3?** For some villages, it can be easier to count the vehicles separately for all of your stores, offices, etc. You can count the number and write it directly into **Column # 4**. If you feel it is easier, or want to be very exact, you (or a Summer Youth worker?) can go around to each household too, and count the vehicles one-by-one. Then just fill in Column #4 with those numbers.

6. Now you can fill in any unfilled cells for **Column # 4** Multiply **Column #1** by **Column #3**. Write the number in **Column #4**. Note: If you have **special operations**, you can count this number up and add it to the number you just wrote in **Column #4**. OR your can address your special operations separately. For example, a cannery or Coast Guard might recycle their batteries on their own.

In the end, what you should have in **Column #4** now is the estimated **total number of vehicles in service**. Don't worry about the vehicles at the dump or junked for now. You can count those later. We are just looking at how many additional batteries are ready to be recycled each year in your community.

7. Add up all the numbers in **Column #4,** from top to bottom. Write the total at the bottom of **Column # 4.** This is the **total number of vehicles** in your community. This number can be important for vehicle backhaul planning and community education.

8. Divide **Column # 4** by **Column # 5.** Write the number in **Column #6** for each line/row**. This step is important**. Batteries last more than one year, so the number of vehicles in your Village isn't equal to the number of used-up batteries that are generated each year.

9. Add up all the numbers, from top to bottom, in **Column #6.** Write it at the bottom of **Column #6.** This is the **total number of batteries each year** to plan for.

10. Multiply **Column #6** by **Column #7.** Write the number in **Column #8**. This is your estimated **total weight for each battery** type.

11. Add up the numbers in **Column # 8.** Write the total at the bottom of **Column #8. This number is important.** It is the **total weight of batteries you will be aiming to backhaul each year** for a sustainable plan. It might take you many years for your battery program to reach this goal. That is normal.

12. Multiply **Column #6** by **Column #9.** Write the number in **Column #10.** This is how much **total lead each type of vehicle is contributing each year** to the lead in your community. **What kind of vehicle is your biggest lead problem?**

13. Add up the numbers in **Column # 10**. Write it at the bottom of **Column #10**.   This is the **total amount of lead being generated from lead-acid batteries each year.** Lead can kill fish and waterfowl. Eating just 3 lead shot pellets can kill a waterfowl within a few weeks. Lead hurts children's developing brains. It can cause a number of neurological problems in adults. Get this lead out of your Village and subsistence grounds.

14. **How much has accumulated?** This step is not in the Table. But you can use the battery weights and lead amounts in **Column #9** to estimate **how much lead from batteries is lying around in abandoned vehicles**. Just count the number of junked vehicles in-town, at the dump(s), and on the River banks. Add that to the amount that you will need to get out in a one-time backhaul.   After you have taken care of all the batteries lying around, you will be caught up. Again, it will probably take a long time to catch up!

15. **You can also estimate how much lead from batteries is in your dump or surrounding area.** This includes the **lead that you may not be able to recover** because the batteries were burned, or dumped into the waters. Take for example, the last 20 years. If your population has been about the same, then you can multiply the bottom total in **Column #10** by 20 years of accumulation. If your population has been changing a lot, you can get a rough idea by using "time period increments".

For example: If you calculated that **2,200** pounds of lead is generated from batteries each year in your community, and you have **400** people living there:

Time period	Total lead from Table (bottom of Column #10)	Total popula-tion now	Average popula-tion then	Ratio to multiply by	Lead generated from batteries *each year* during the time period	Total estimated lead generated in full time period	Estimated recoverable lead (lying in town, on banks, in dump, etc.)	Estimated lead placed into our land and water **forever**
15 to 20 years ago (**5-year period**)	**2,200** pounds (lbs)	400	200	200÷400 = **0.5**	=0.5 × 2,200 = **1,100** lbs	1,100 × **5** years = **5,500** lbs	**5%?** 5,500 × 5% = 275 lbs	5,500-275 = **5,225** lbs
5 to 15 years ago (**10-year period**)	**2,200** pounds (lbs)	400	250	250÷400 = **0.625**	0.625 × 2,200 = **1,375** lbs	1,375 × **10** years = **13,750** lbs	**20%?** 13,750 × 20% = **2,750**	13,750-2,750 = **11,000** lbs
Last 5 years (**5-year period**)	**2,200** pounds (lbs)	400	375	375÷400 = **0.94**	0.94 × 2,200 = **2,063** lbs	2,063 × **5** years = **10,315** lbs	**50%?** 10,315 × 50% = **5,167** lbs	10,315 -5,167 = **5,168** lbs
Last 20 years Total						**29,565** lbs of lead, (about 15 tons), just from vehicle batteries.	**8,192 lbs** (about 12,200 lbs of batteries to backhaul from previous years)	**21,393** lbs of **lead** placed in the environment forever, <u>so far.</u>

Note: You can use the same procedure to calculate the **weight of batteries**, or the **number of batteries**, that were generated in your community in the last 20 years (or 5 years or 10 years, etc.). You can use that number for calculating **how much you need to backhaul**, or **how much of the total possible has your community backhauled.**

If you back-haul, remember that the shipping weight is the *total battery weight*, and **not** *the weight of the lead.* An average amount of lead for lead-acid batteries is about **60%** of the undrained weight (actually 58.6%). **So if you were to backhaul 10,000 pounds of lead, that would be about 10,000 ÷ 60% = 16,667 lbs of batteries.** You should never drain the acid from the batteries. But fully **drained batteries** (those that leaked out the acid) **weigh about one-third less than undrained batteries.** For completely drained lead-acid batteries, the lead is about **73.6%** of the battery weight.

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16. **Participation Rates and Program Performance** Do you have a battery recycle program? You can estimate the number of households participating by:

Number of households dropping off batteries ÷ Total number of households.

Then be sure to change the number into a percentage by multiplying by 100%.
For example, **0.37** = **37%.**

17. **Don't keep track of who drops off the batteries?** Do you know how many batteries you ship out or collect each year? Or how much weight?

Then try: Number of batteries **collected** ÷ Number of batteries **generated** (the number at the bottom of **Column #6**). Some households might be dropping off all their batteries, and some households might be dropping off none of their batteries. So the resulting number isn't exactly the household participation rate, but it does get you a **recycling success rate,** which is still a:

Performance Indicator....

You can also estimate *Performance* by:

Total weight shipped out each year ÷ Total weight of batteries generated each year.

Remember **if you have been collecting the batteries from several years**, you will want to **divide by the total generated** from all of those years. See Table 2 and Step 15 for how to estimate the total from the past years.

Or if you want to see **how much lead you have taken out** of your community and lands, divide the total *lead* shipped out (not the total battery weight) by the total *lead* accumulated (recoverable and non-recoverable) in the last 20 years.

Performance monitoring

Real performance monitoring looks at **how good you are doing compared to how good you did** last year-- **and how good you could do** if everybody participated fully in your program. It is like fishing:

> Joe caught 5 fish. Is he a good at fishing or not? You can't tell. We all know that depends on how many fish were there in the water, how difficult they were to catch (what season, what weather, time of day, etc.), **how long** he took to catch them, and what kind of fish. Were they big enough to feed his family and those in need (trout or King Salmon?

Here are the questions to ask yourself when deciding whether your number(s) are truly "performance indicators" (i.e. what the agencies are looking for):

1. Can you compare your number(s) to last year's performance or someone else's performance? e.g. "We collected 50 atv batteries this year, and 40 batteries last year" OR

"We collected 1500 lbs of batteries this year, which is about the same as the "3-Rivers" Village that has about the same population".

2. Can your number tell you how much potential you have for doing better? For example, "We generate 2,200 lbs of batteries each year, but we are collecting only about 550 lbs each year. So we are only getting about 25% (i.e. 550 ÷2200) of our batteries, and the rest are accumulating in our land and water. We have the need to spend more time in community education and focusing on why people are not using our program, and then change how we do it if we need to."

Is your collection rate already near 100%?, then it is time to **work on developing another program that will help your community**, while maintaining the rate you have. If you want to **get all the lead out, work on recycling computers, and replacing lead shot and lead sinkers** with alternatives next. Remember, if it is less than 100%, the collection rate can tell you what is accumulating each year. You can use that number to plan out a full backhaul.

3. Does your number describe the expected or true potential, or do you need an additional number or words? For example, "Even though we didn't increase the number of batteries collected, 5 households moved out, so the total number of batteries that can be collected decreased" OR "Our collection rate went down slightly, but that is because people started using/buying vehicles less, due to weather, or no fish, or they started

walking more, or the fuel costs went up really high." OR "Our funds were cut, so we couldn't staff our collection totes, or carry out our targeted education, like we usually do". Some seasons, the true number will be less, and some more. **If there is no way to describe the potential in numbers, describe it in words, or use both.** You can ask your agency project officer, resident math whiz, or school Science teacher for "number" suggestions.

With batteries, there will be a couple of households or outsiders that just won't recycle, ever. Also, you might have staff turnover, or search and rescue, or barge cancellation just at the wrong time. Write down whether any factors contributed to less or more batteries being collected or backhauled that year. Even the best recycling programs in urban areas in the United States can't get to 100%. And household hazardous waste collection days in the lower-48 generally only have less than 10 percent participation rate from people who are eligible to use the service.

4. Can you set a goal from your number that makes sense? Each year you can calculate your participation rate and an overall recycle or "getting-the-lead-out" success rate. You can set your goal for your IGAP workplans (and other grants that you write) to be a little higher each year.

Nationally, about 96% of lead-acid batteries are recycled. That sounds to us like most of the remaining batteries are sitting out in our Villages! **We didn't used to have an alternative. But now, back-hauling batteries can be set up for free.** It is one of the biggest steps you can take to protect your subsistence and your community's health. See http://www.epa.gov/opptintr/lead/leadinfo.htm#health for some health dangers associated with lead.

Setting Up A Battery Backhaul. Go to SWAN:

http://www.ccthita-swan.org/Tutorials/batt_recycle.cfm for a step by step guide in setting up a battery backhaul. You can go to the SWAN Village-to-Village message board at http://members.boardhost.com/SWAN/ , and ask other Villages in your region which barge or plane company they use for their program. If you are on the Yukon River, try contacting the Yukon River Inter-Tribal Watershed Backhaul program staff, or Tanana Chiefs Conference solid waste staff, or Council of Athabascan Tribal Government's environmental staff. They can help you plan for backhaul for the next barge year. If you still have trouble, or are not sure where to go, contact us at rpaddock@ccthita.org or phone 1 (800) 344 1432 and ask for Ray Paddock, your friendly SWAN coordinator and all around good guy. We will help get you set-up step by step.

> **Once you have set up a backhaul program. Keep raising the bar on community participation. Include your numbers that you have calculated in your grants. Keep track.**

Other Lead Sources

We mentioned this earlier. Lead-acid batteries are probably the biggest source of lead in your village. But **once you have your batteries under control, there are other important sources** to do something about. You can **use the same procedure** you did here for counting batteries as you did **for computers and lead sinkers and cases of lead shot** in your community.

Computers have to be kept out of our unlined dumps. Besides lead, they have lots of other health-risk associated heavy metals and chemicals. Computer manufacturing plants have contaminated local water sources all over the world. See http://www.ccthita-swan.org/Tutorials/computer_recycle_intro.cfm about recycling computers and what they contain. Work with your school to make sure they ship their computers back to a responsible computer recycler, or at least a Class I lined landfill away from an area that people live from the land.

Lead shot and sinkers need to be replaced as a long-term goal: Working towards **reducing lead shot and lead sinkers**, and **replacing them** with lead-free substitutes will be a gift to your children and descendants and lands. You can accomplish this slowly through community education, trade-in/subsidy programs, and actions on getting the cheapest lead-alternatives into your community.

Lead shot and sinker effects : If waterfowl ingest lead from shot or sinkers, they can die within 3 – 6 weeks, and many more will contract one or another common bird illness, brought on by a lead-caused weakening of their immune systems. Worse still, some of those sick birds could start epidemics that kill many of their non-poisoned companions. In fact, the available reports indicate that as many as **five waterfowl may die from lead-related causes for every one** that has an actual lethal poisoning.

> **Health-wise, it is better for a community to continue subsistence no matter what kind of shot or sinker is used.**

Steel Shot: But for those who can **afford it** and **find it**, **steel shot is much better**, and should be **a community goal**. If you come across lead shot or sinkers while hunting, pick them up (with gloves), and bring them back in. Consider ways to encourage folks to switch.

First, make sure steel shot is available locally in your stores. Does your store have access to internet? **Offer to find the cheapest steel shot prices for your store**. Look up "steel shot" in Google or Yahoo Search engines. You might be able to bring the price down for your store(s) to just a little over one dollar difference for a case. In Alaska, lead shot is usually imported from Mexico, and steel shot from Canada, or the Northwest. **Other ideas:** Provide steel shot as raffle prizes, and consider using Bingo profits, or plan a lead shot pollution prevention demonstration/education program that can subsidize the cost difference.

Lead sinkers and jigs: See http://www.cws-scf.ec.gc.ca/fishing/alter_e.cfm for a list of lead-free sinkers and jigs. That link will also take you to general information about lead sinkers and their effects. http://www.cws-scf.ec.gc.ca/publications/AbstractTemplate.cfm?lang=e&id=1031 is a good technical (i.e. long) summary of effects.