



A First Look at Challenging Claims

Overview

Participants review a document with claims made by a potential polluter and identify quantitative claims. They prioritize those claims they would like to question or challenge.

When to Use It

When a recently published document makes claims about environmental pollution. This “claims document” might be:

- a news story
- a proposal for a new or expanded project
- an environmental impact study
- a public statement or press release

This workshop also serves as a diagnostic tool, giving the organizer a sense of which other *Statistics for Action* activities could be useful to the group.

Adapting the Workshop

If you already know which claims you want to challenge, or there are only one or two claims, go directly from Step 1 to Step 3 – *skip Step 2* and don’t use the worksheet. You can also skip the second part of Step 3, in which you graph the claims for comparison.

Skills

- Identify quantitative claims, explicit and implied
- Guess how claims might be incorrect or incomplete
- Decide which claims are best to challenge

Time: 75 Minutes

Materials & Prep

- Before the workshop, go over the claims document with a group leader. Choose *just a few pages or paragraphs* for the group to examine more carefully. The resource *Strategies for Challenging Claims* (included in this workshop) can help with this selection. Edit as needed, and copy your selections. (1 per pair)
- Easel and flip charts (or whiteboard)
- One flip chart with an empty set of X-Y axes for “How Helpful” vs. “How Easy” (see Step 3)
- Pens and highlighters
- *Challenging Claims* worksheets (1 per pair)
- Tables, desks, or clipboards, so people can write on their worksheets.



Step 1: Setting the Stage (10 minutes)

Tell participants what initiated this meeting (the document they'll examine tonight). Claims are being made in the document. The group needs to decide whether or not to challenge any claims. This workshop will help with that – though the group will *not* at this time evaluate the truth of the claims.

Claims are hard to challenge if they're not measurable. Ask the group if they can think of claims that are *not* measurable. You can prompt with examples:

The new waste incinerator will be good for this community.
XYZ Inc. cares about communities like Springfield.

Ask how we might prove that one of those claims is false. It's almost impossible. There might be evidence to support the above claims – like “the waste incinerator will bring new jobs, and that's good” – but then the measurable claim would be about how many jobs it would bring, *not* about how “good” it is.

Ask the group for examples of other claims that *are* measurable. You can prompt with:

The new factory will provide over 200 new jobs in the community.
The new power generator will reduce residential electricity rates.
The level of mercury in the soil is below the legal requirements.

Confirm that the group agrees that those statements are easier to prove right or wrong. Ask them to get into pairs or groups of three. Give each group some part of the claims document (for example, Group 1 does the first page, Group 2 gets the second page, etc.). Using a highlighter, groups will mark the measurable claims they find.

Step 2: Identifying and Examining Claims (25 minutes)

(If you have already decided on a claim you want to challenge, skip to Step 3.)

Give the group 10 minutes to find and highlight measurable claims. As they work, give each group a copy of the *Challenging Claims* worksheet. When you give each group the worksheet, briefly review the instructions on the sheet with them to be sure they understand what to do.



Step 3: What Claims Should We Challenge? (30 minutes)

When groups have finished their worksheets, ask who thinks they have the best challenge. Discuss each claim and take notes for the group.

- What's the claim? Write the key measurements.
- What's the question or challenge?
- Where could we find out the answers, or more information? What help, skills, resources, or funding would we need? Based on that, how easy (1–10) will it be to challenge?
- If it succeeds, what could happen? If it fails, what could happen? Based on that, how helpful (1–10) will it be to challenge?

(A) Claim: 300 tons per year

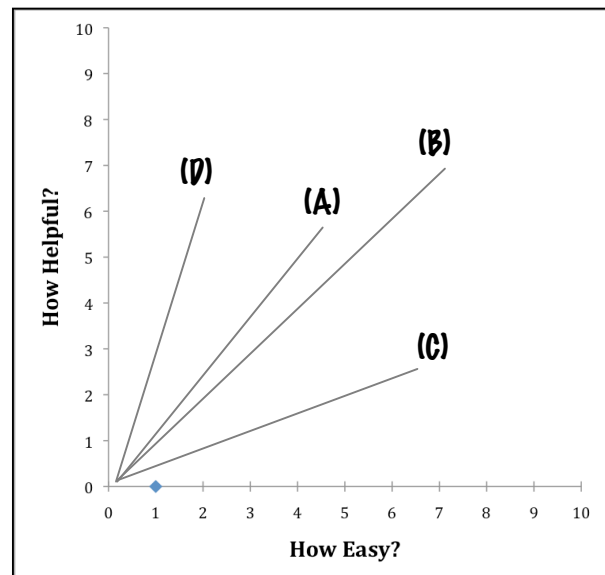
Challenge: It will be more.

How: They exceeded waste permits for 5 years. Info is on delivery manifest records kept by the state.

(Note: If you have already decided on a claim you want to challenge, skip to Step 4.)

When you've finished with a claim, label it (A). Then plot it on the chart according to how the group rated it.

Repeat this process for other claims the group wants to challenge. When you feel like you have enough claims listed, or if time is running out, draw lines (in different colors, if possible) from the bottom left corner of the chart to the label for each challenge. (See the example at right.) Explain that the claims with the longest lines are the best ones to challenge.



Use the chart as a tool to help the group decide which claims to challenge, but don't feel constrained by it. Also, don't just choose one claim. You might designate one as the top priority, but the research may not yield anything useful, so you should have others as a backup.



Step 4: Wrap-Up (10 minutes)

Decide as a group:

- What steps are needed to follow up on the group's choices?
- Do we need to know more about the claims before moving forward?
- Who will take on different tasks?
- What is a reasonable timeline for each step? *Note:* If none of the next steps can start for six months, you may want to add a claim that can be investigated right away.

During or after the meeting, you can make a note of any other *Statistics for Action* activities you think might be relevant or helpful for the group. Suggest these activities to the group leaders as possibilities for future meetings.



Challenging Claims Worksheet

1. Choose up to three claims you think are suspicious. Write each in a box.
2. Circle the measurement words in each claim. See examples, below left.
3. For each claim, write how you might question, challenge, or investigate the claim.
4. How easy or hard will it be to challenge each claim? Rate each from 1 to 10.
Then rate how much you think a successful challenge would help your campaign.

<p>Examples of Measurement Words</p> <p>Numbers 237,000 five dozens millions 0.0043</p> <p>Units acres jobs miles per hour $\mu\text{g/L}$ dollars per year</p> <p>Comparisons less than six times 30% more than a minimum of</p> <p>Statistics average median 2/3 of residents margin of error probability</p>	<p>Claim #1:</p> <p>Challenge:</p>
	<p>Easy challenge? (circle) Very Hard 1 2 3 4 5 6 7 8 9 10 Very easy</p> <p>Help our campaign? No Help 1 2 3 4 5 6 7 8 9 10 Big help</p>
	<p>Claim #2:</p> <p>Challenge:</p>
	<p>Easy challenge? (circle) Very Hard 1 2 3 4 5 6 7 8 9 10 Very easy</p> <p>Help our campaign? No Help 1 2 3 4 5 6 7 8 9 10 Big help</p>
	<p>Claim #3:</p> <p>Challenge:</p>
	<p>Easy challenge? (circle) Very Hard 1 2 3 4 5 6 7 8 9 10 Very easy</p> <p>Help our campaign? No Help 1 2 3 4 5 6 7 8 9 10 Big help</p>



Strategies for Challenging Claims

Aspect	Meaning & Examples	Strategy
The Claim	A statement about something measurable that could be disputed, questioned, or challenged	
Measures	What is measured, estimated, or promised?	
Units	Dollars and cents. Seconds, minutes, years. Inches, miles. Square feet, acres, square miles. Gallons, cubic meters, liters. Pounds, kilograms, tons, micrograms. Watts, kilowatt-hours. Truck trips, jobs, new cancer cases.	If you challenge these, you'll need to be very familiar with the units in question. That's easy for dollars, harder for micrograms. Make sure units are consistently metric or English; they shouldn't switch back and forth.
Calculations	How are the measures calculated, combined, or related to each other?	
A ratio	A relationship between two or more units listed above: Miles per gallon. Micrograms per liter. Tons per year.	Is the ratio used the one you really care about? Are they using X per year when you really care about X per day?
An average	A number representing many numbers taken over time: <i>"The average number of truck trips per day in 2008."</i>	How was the average calculated? Did they leave out any outliers (very high or low data points)? Maybe average is misleading, and you really care about high, low, or median. Maybe the official average is 10 per day, but it's actually 300 one day per month, and 0 the rest of the month.
A maximum, minimum, or limit	A promise about a number always being smaller or larger than a number: <i>"The new plant will provide at least 25 new jobs."</i> Or a legal limit set by the government: <i>"The MCL for lead in drinking water is 15 µg/L."</i>	Watch out when promises include averages – for example, the annual <i>average</i> may be below a maximum, but a particular day or month may be over the maximum.



Aspect	Meaning & Examples	Strategy
Time	Is it about the past, present, or future?	
Past/present	Is the claim about something could be measured today?	Verify by using existing information. Did they leave anything out?
Future	The claim is a prediction about the future.	Look at the numbers/formulas used in making the prediction. Did they assume worst case or best?
Exactness		
	How exact is the claim?	
Exact statement	An exact number that has already been measured: <i>“The plant releases 500 gallons of effluent per day into Bo Creek.”</i>	Find the data sources and verify.
Exact estimate	An exact number or range, but based on a guess, not a real measurement: <i>“Officials estimate that the typical person doesn’t eat more than 5 or 6 fish from the stream per year.”</i>	Look at the numbers and formulas used to make the prediction. Find out what counts toward their numbers. For example, does “3 acres of new open public space” include 2 acres of parking lots? Does “\$12 million in new property tax revenue” include the reduction in residential home values when a nuisance moves into the neighborhood?
Fuzzy estimate	A claim with no specific numbers, but which might still be verified or challenged: <i>“We expect the number of smell complaints to decrease significantly after this year.”</i>	Push for more precision and exact numbers or range (minimum and maximum). Push for likelihood.
Incomplete estimate	A claim that is subjective or lacks critical information: <i>“XYZ Corp. will provide incentives and low-interest loans to weatherize homes.”</i>	Without any numbers, it’s impossible to know if this is true or if it will have an impact in the community. Push them to quantify the claim with specific amounts. Find out what counts toward their estimates. Is the claim based on some unscientific assumption?



A First Look at Communicating with Numbers

Overview

Participants look at examples of ways to use numbers in their talking points. Then they brainstorm facts about their own community and campaign that could be used to create similar talking points. They finish by making a plan to get any information they don't have yet.

When to Use It

When preparing to communicate about an environmental issue to decision-makers, media, and the community.

This workshop also serves as a diagnostic tool, giving the organizer a sense of which other *Statistics for Action* activities could be useful to the group.

Notes for the Facilitator

The handouts for this session include seven sets of messages that could become talking points. For each set, the original fact is in a gray box; the other boxes show different ways to state that fact. Which of these you use, and how, depends on how you run the workshop (see options listed in Step 2).

Skills

- Learn different ways to represent numbers in campaign messages
- Think about which numbers might be used in a message supporting the local campaign.

Time: 60 Minutes

Materials & Prep

- One or more sets of example messages. (Choose one option in Step 2 and prepare the handouts accordingly.)
Copies of *Numbers Make Your Message Stronger* (1 per pair)
- Easel with pad or whiteboard, markers
- Bring in data or facts relevant to the group's campaign. You might also bring relevant data about the community: population, number of households, etc.



1. Setting the Stage (5 minutes)

If you have a personal story about using numbers in campaign messages, start with that story. For example: “Once on the ____ campaign, I talked to a reporter for 10 minutes, and the quote she used was the one with the statistics in it.” Remind participants that for their campaign to be effective, they will need to deliver short, carefully worded messages to decision-makers, media, and the community. A message is more believable when we use real facts and numbers. But using numbers poorly could backfire and hurt the campaign.

Give the group an overview of the activity:

1. First you’ll look at ways other campaigns have considered using numbers in their campaign messages, to give you some ideas.
2. Then you’ll brainstorm facts about your own community and campaign, and think about how you could create messages around these facts.
3. Finally you’ll make a plan for how to get any information you don’t have yet.

2. Getting Ideas for Messages (20 minutes)

Options for using the sample message sets:

Small group: Hand out each set of messages for participants to read. Have the group decide which messages are most effective and least effective.

Larger group: Divide into smaller groups. Cut apart the sample messages in one set and give a complete set to each small group. Groups arrange the messages in order from most effective to least effective, then share their decisions with other groups.

For a conference workshop: Enlarge each individual message in one sample set. Have volunteers stand before the group, holding up each message. Have the audience tell the volunteers where to stand, ordering the messages from most to least effective. If the group can’t agree, take a vote.



After any of the above situations, ask the group:

- Which statements were the most surprising? Memorable? Powerful?
- Which ones were confusing? Awkward? Unimpressive?
- What are the features of an effective message?

Write the answers to the last question on an easel or whiteboard. During the discussion, you can supplement with ideas from the handout *Numbers Make Your Message Stronger*. When the group runs out of ideas, hand out copies of *Numbers Make Your Message Stronger*. Explain that these are tips and ideas for writing their own messages.

3. Brainstorming Messages (15 minutes)

Shift the focus back to the community's campaign. Have the group brainstorm a list of facts they think are important to communicate, and compelling ways to express those facts. Follow brainstorming rules: No discussion or criticism, just list the ideas. The messages don't have to be fully formed, and you don't need all the facts right now. It's OK for someone to say, "How about showing the total mercury emissions per year, per person in the city?" and then find those numbers after the meeting.

4. Prioritizing and Delegating (10 minutes)

When brainstorming winds down, have the group choose several ideas that seem promising. If the ideas require additional research, choose volunteers to find the answers. Places they might go for research:

- Federal and State government websites (EPA, NOAA, Census, Dept. of Energy)
- City/Town Hall (Clerk, Assessor, Finance, Planning)
- Testing and monitoring reports from licensed site professionals

Close the activity by asking everyone to bring the information they find to the next meeting, when the group will practice changing their raw facts into powerful messages.



Numbers Make Your Message Stronger

The numbers in pollution science can be so big or so small, they're hard to imagine. Numbers are more powerful when people can picture seeing and touching them.

1. Choose a Strategy

Use familiar units. Convert to units people hear or see in everyday life.

Cubic meters
kilometers
kilograms

Gallon milk jugs, sugar packets, teaspoons, football fields, 50-gallon drums

Make it local. Use distances, areas, volumes, and heights based on familiar things from your town.

245 miles
12.3 million gallons

...would reach from Bob's gas station to Dora's Deli.
...would fill Memorial Stadium.

Make it personal: Divide the amount up among the people who will be impacted. Divide it up per person, household, or town.

1,300 tons of trash per day

150 pounds of trash per person, every day.

Use time to scale up or down.

800,000 tons of toxic waste per year

One and a half tons per minute.
Fifty pounds per second.

Use the problem to your advantage. Include negative images from the problem in your message.

40 truckloads of coal per day

A year's worth of trucks, lined end to end, would fill Route 7 from here to the state line.

Show the trade-offs with money.

Factory provides \$24,000 in tax revenue

...sounds like a lot, but it's only \$32 per resident. You can barely buy a *cake* for that!



2. Check for Common Pitfalls

Make sure it makes sense. Use an example that makes sense for your situation. So if you're talking about a part per million in water...

NO: One pancake in a stack a mile high

YES: One drop in an Olympic-sized swimming pool

Compare to things with a uniform size.

NO: Trees, city blocks, houses, lakes

YES: Football fields, gallons, pounds

Focus on understanding. A bigger number doesn't mean bigger impact.

NO: 136,800 minutes

YES: Over three months

Be careful with length, area, and volume: A ratio between lengths changes when you switch to area or volume

NO: 100 cm in a m, so 100 cm³ in a m³

YES: 100 cm in a m, but **1,000,000** cm³ in a m³

3. Polish Your Message

Use friendly numbers. When possible, round off your final number

NO: 197 tons
2,480,000 people

YES: 200 tons
Two and a half million people

Use familiar fractions, ratios and percents instead of decimals or numbers that are hard to picture.

NO: 12.4% of town residents

YES: About one in eight town residents

Set 1: How toxic is dioxin?

<p>The legal limit for dioxin in drinking water is 0.00003 µg/L. That's the same as 1 gram of dioxin added to 8.8 billion gallons of water.</p>	<p>1 gram of dioxin is enough to poison the amount of water the average American would use in 15,000 years.</p>
<p>1 gram of dioxin is enough to poison the water that 15,000 Americans use in one year.</p>	<p>1 gram of dioxin would make 8.8 billion gallons of milk unsafe to drink.</p>
<p>1 gram of dioxin would poison 13,333 Olympic sized swimming pools' worth of water.</p>	<p>1 gram of dioxin would make the amount of water used by all of the people of Concord, MA, unsafe to drink for a year.</p>
<p>One half-gram of dioxin would poison all the water in Walden Pond.</p>	<p>1 gram of dioxin is enough to make 33 billion liters of soda unsafe to drink.</p>

Set 2: How many truck trips for the new incinerator?

<p>The new incinerator would take in 3600 tons of construction and demolition waste per day. A standard garbage truck holds about 25 tons.</p>	<p>The new incinerator would add 144 garbage truck trips per day.</p>
<p>The new incinerator would add over a thousand garbage truck trips per week.</p>	<p>The new incinerator would add over fifty thousand garbage truck trips per year.</p>
<p>During the daytime, garbage trucks would be going in or out of the new incinerator plant every two and a half minutes, on average.</p>	<p>The new incinerator would add a thousand garbage truck trips per week. Lined up end to end, those trucks would reach from one side of town to the other.</p>

Set 3: How much over the limit?

<p>The legal limit for TCE in drinking water is 5 µg/L.</p> <p>Local tap water tests found TCE levels as high as 200 µg/L.</p>	<p>Testing found TCE as high as 4000% of the legal limit.</p>
<p>Testing found TCE as much as 40 times the legal limit.</p>	<p>Tests showed that some TCE levels were 195 µg/L over the limit.</p>
<p>If the legal limit is like a measuring cup's worth of TCE, what the tests found was like two and a half gallons' worth!</p>	<p>There's enough TCE in David's tap water to make his family sick 40 times over.</p>

Set 4: How many kids have asthma?

<p>The health study surveyed 335 children in one community. Of these children, 81 were told by a health care worker that they had asthma.</p>	<p>81 out of 335 children in our community have asthma.</p>
<p>24.2% of children in our community have asthma.</p>	<p>One out of every four children in our community have asthma.</p>
<p>A quarter of the children in our community have asthma.</p>	<p>For every three healthy children in our community, there is one child with asthma.</p>
<p>Think of four kids in our community: Your daughter, your neighbor's son, the paper boy, your niece. Now pick one of them. You just chose the next child to get asthma.</p>	

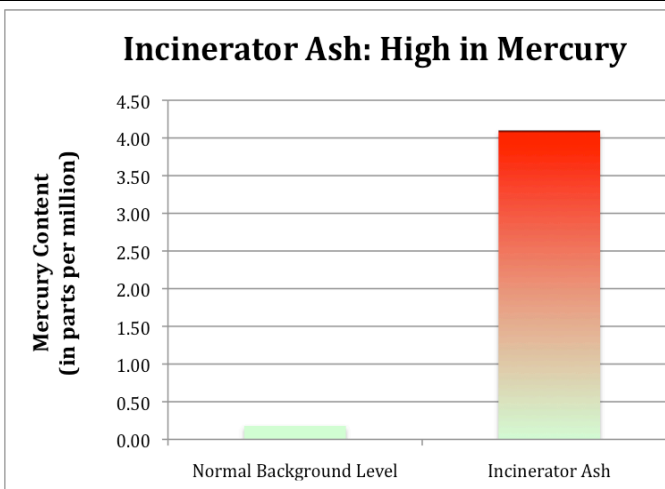
Set 5: Recycling and energy

<p>Making a plastic bottle from new materials uses 5200 BTUs of energy. Making a plastic bottle from a recycled bottle only uses 1400 BTUs.</p>	<p>Recycling a plastic bottle saves 73% of the energy used to make a new plastic bottle.</p>
<p>Making a bottle from new plastic takes uses three times as much energy as using recycled plastic.</p>	<p>With the energy it takes to make one bottle from new plastic, you can make <i>three</i> bottles with recycled plastic.</p>

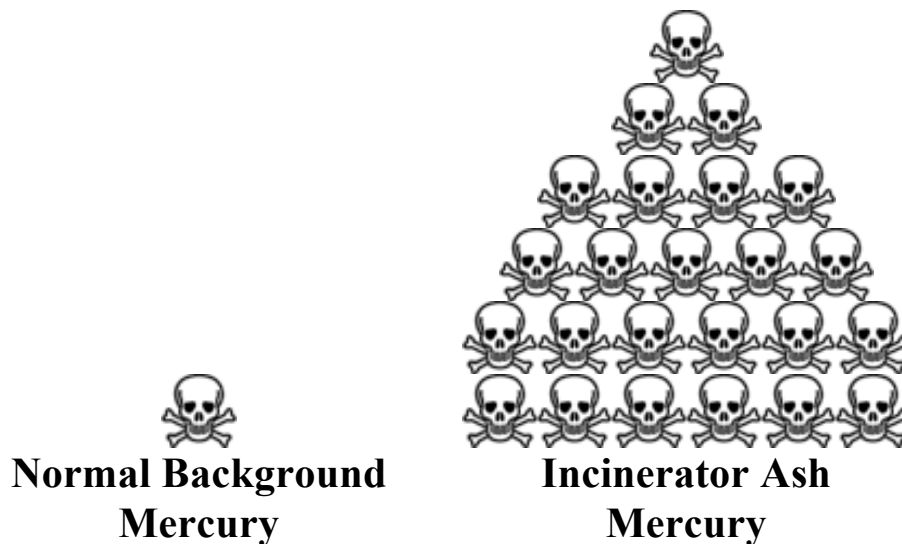
Set 6: Mercury in incinerator ash

The average background level of mercury in the soil in this area is 0.18 ppm. The ash from the trash incinerator contains 4.3 ppm of mercury.

The ash from the Foster Wheeler incinerator has 23 times as much mercury as typical U.S. soils.



Incinerator Ash: High in Mercury



Set 7: Pesticides

<p>17 of 32 of LawnCo pesticide products contain possible carcinogens.</p> <p>9 of 32 LawnCo pesticide products contain known or suspected reproductive toxins.</p>	<p>53% of LawnCo pesticides contain possible carcinogens.</p> <p>28% of LawnCo pesticides contain known or suspected reproductive toxins.</p>
<p>More than half of LawnCo pesticides contain possible carcinogens.</p> <p>More than a quarter of LawnCo pesticides contain known or suspected reproductive toxins.</p>	<p>One in two LawnCo pesticides contain possible carcinogens.</p> <p>One in four LawnCo pesticides contain known or suspected reproductive toxins.</p>



A First Look at Environmental Test Results

Overview

Participants look at environmental tests and record observations or questions on sticky notes. They group those notes by category and reflect on what they need to know in order to understand test results.

When to Use It

When a community receives the results of air, soil, water, or other environmental tests, and doesn't know where to begin.

This workshop also serves as a diagnostic tool, giving the organizer a sense of which other *Statistics for Action* activities could be useful to the group.

Facilitator Notes: What to Use

When selecting pages of test results, don't use the whole report. Choose a single page from each of the following sections, if available:

- Narrative summary of report
- Tabular summary of key data
- Maps of the site with testing locations marked
- Tables of full test results, including results both over and under the detectable limits
- Descriptions of samples from the field (temperature, pH, etc.)
- "Chain of custody" reports

Skills

- Identify broad questions about a report ("Is it safe for my child to...?")
- Identify specific questions about a report ("What is mg/Kg? What is Naphthalene?")
- Group and prioritize questions

Time: 45 Minutes

Materials & Prep

- Choose lab report pages for the activity (see *What to Use*). Post enlarged versions on the wall in the meeting room. Leave plenty of space between them. Include one large blank sheet labeled "Other Questions or Observations."
- Cut apart *Participant Instructions* slips. Tape them on or near each posted lab report page.
- Print out the *Questions & Observations* pages. Post them together in a group on the wall.
- Review relevant *SfA* materials before this meeting. Be prepared to suggest them at the end of the meeting as appropriate.
- Bring medium-size sticky notes, markers, pens.



A First Look at Environmental Test Results

Step 1: Setting the Stage (5 minutes)

Tell participants lab results can be confusing. To understand them, we need to see what we can figure out on our own, and what questions we have.

Step 2: Looking at the Reports (25 minutes)

Divide into small groups, with at least two people per group. For example, if there are 6 lab report pages posted, divide into 6 groups. Invite each group to one of the posted pages. Give each person sticky notes and a marker.

Small groups should discuss each page, then write observations and questions on the sticky notes and post them on the lab report pages. If they are slow to do this, you can “seed” the pages with notes of your own. When groups have finished one page, they can move on to another.

After 10-15 minutes, ask participants to finish up where they are and select a few sticky notes to post on the *Questions & Observations* sheets. They should talk together about the possibilities as they look for the category that best fits each note. Continue until all the sticky notes have been categorized. If the category for a particular question is not clear, a participant can post it with “Other Questions or Observations,” or break it into two or more simpler questions.



Step 3: Debriefing (10 minutes)

Ask the group:

- How was that experience?
- Did you notice anything particularly surprising or interesting?
- Did you see any patterns to the questions and observations?
- What seems most important?

As needed, share your own observations for discussion.

Tell the group

- Some questions can be answered by turning to resources or doing a little research.
- Other questions raise issues that we can explore in activities at future meetings.
- Some questions have no definite answer, because not enough is known about the situation.

You might choose a few of the questions they wrote as examples of each idea.

Step 4: Follow-Up (5 minutes)

(Note: If the group is large, you may wish to do this with a smaller group of leaders.)

Review the sticky notes and decide what the group needs most to support its overall goal. Among the options could be:

- Find a resource that defines some of the key terminology.
- Divide up definition-related questions among members of the group, and ask people to research the answers before the next meeting.
- Do a related *Statistics for Action* activity at the next meeting to help the group get a deeper understanding of the concepts involved.
- Bring an EPA or engineering expert to the next meeting, or call such an expert between group meetings and bring the answers to the next meeting.
- One or two members of the group could develop a deeper expertise/understanding about something between meetings and share with the rest of the group.

A First Look at Environmental Test Results

Participant Instructions (Attach one to each page of test results.)

Look at this page carefully. What do you notice? What makes sense?
What does not make sense? What questions do you have?
Write down your observations and questions, one per sticky note.
Because we will move the notes around, include details. (So, don't write,
"What does this mean?" Instead write, "What does naphthalene mean?")

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Questions & Observations

Definitions, Terminology, and Chemical Properties

Example: What are PCBs? Are they dangerous?



Questions & Observations

The Testing Process

Example: Where did they test for PCBs?



Questions & Observations

Results as Presented in the Report

Example: What amount of PCBs did they find under the old storage tank?



Questions & Observations

Is Human Health at Risk?

Example: Could those PCBs get into my drinking water? My basement?



Questions & Observations

What Action Should Happen Now?

Example: Who will pay to clean it up?



Questions & Observations

Other Questions or Observations