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Chapter 3

Structure: Providing Transition, Depth, and Emphasis

Science is built up with facts, as a house is with stones. But a collection of facts is no more science than a heap of stones is a house.

—J. H. Poincaré

Structure is not just the organization of details. Although organizing details in a document is certainly important, many well-organized documents fail to inform because the writer has not made strong transitions between the details or has not presented the details at the proper depth or has not placed the proper emphasis on the details.

Transitions Between Details

In a scientific document, you make transitions not only between sentences and paragraphs, but between sections. You may organize your paper into logical sections, but if you don't make transitions between those sections, you can lose your readers.

In the previous chapter, several reasons were given for the use of sections in scientific writing: to help emphasize details, to reveal the logical strategy of the details, and to parcel out details so that the information is easier to digest. A disadvantage of using sections is that they make inherent discontinuities in the reading. In other words, between each section there is white space, which makes the readers stop. Two ways to overcome these discontinuities between sections are to map the sections and to smooth the entrances into the sections.

Mapping sections is straightforward. When you divide a discussion into sections, you seek divisions that are logical and appropriate for the audience. Perhaps the section names form a sequence of steps, such as the stages of combustion, or perhaps the sections are parallel parts and sum to a whole (the three parts of a comet—head, coma, tail).

How do you map sections? The simplest way is to present the names of the sections in a list just before the sections occur. Consider an example [Saathoff, 1991] that maps three subsections:

> **Dangers of Breathing Compressed Air**
>
> Recreational scuba divers breathe compressed air at depths down to 190 feet. Breathing compressed air at these great depths and even at more moderate depths poses many dangers for scuba divers. These dangers are nitrogen narcosis, decompression sickness, and arterial gas embolism.

Now the readers are prepared for the three subsections that follow: nitrogen narcosis, decompression sickness, and arterial gas embolism.

Besides using mapping to show readers the divisions in a document, you also make transitions by smoothing the entrances into sections. Because readers often skip around in papers and reports, you should make each section and subsection stand on its own. How should you begin a section or subsection? Perhaps an easier question to answer is how shouldn't you begin.

There are three common beginnings to a section that you should avoid. One is the "empty" beginning: Because the first sentence of a section receives heavy emphasis, you want to say something in that first sentence. In an empty beginning, the writer wastes the first sentence and loses an opportunity to inform:

> The behavior of materials in combustion systems has considerable technological significance.

In this sentence, nothing occurs. In other words, the scientist did not advance the knowledge of the audience. The scientist also failed to build a foundation for the rest of the section.

The second type of beginning to avoid is the *"in medias res"* beginning. Here, the writer begins with details that are too specific:

> Item 12 on Drawing XLC-3549 shows the tolerance of the safe adapter.

In this beginning, the engineer quickly narrowed the audience until the only person following the discussion was the author himself.

The third type of beginning to avoid is the "Genesis" beginning. While the *in medias res* beginning opens with details that are too specific, the Genesis beginning opens with details that are too general:

> Man has since the beginning of time attempted to acquire a greater and greater control over his environment. Gaining control over a situation serves not only a survival-related need, but also a psychological need. Man's need for better control of his environment has increased greatly during and following any time of major conflict, such as World War II. This need and desire for control is evident in all technological settings, including the welding field.

By conjuring images of prehistoric man and the Second World War, the engineer has created expectations that a section on welding, no matter how well written, just can't deliver.

So far, we've discussed ways not to begin a section. What then are some proper ways? One straightforward way is to introduce the subject of the section:

> ***Precombustion Processes.*** Precombustion processes for reducing emissions of sulfur dioxide occur before the coal is even burned. There are two major types of precombustion processes: coal switching and coal cleaning.

In this beginning, you include the section heading in the first sentence. Don't think that beginning a section with this repetition of the heading is redundant. A redundancy is a needless repetition. The repetition of the heading in the first sentence of the section is an important repetition because it reinforces the identity of the section. In a sense, this repetition strengthens the audience's confidence in you to deliver what you are promising to deliver. Contrast that straightforward repetition with an abrupt beginning:

> ***Precombustion Processes.*** These occur before the combustion process. There are two major types...

This abrupt beginning throws readers off-balance. The readers don't immediately gather that the pronoun "these" refers to precombustion processes.

The straightforward repetition of the heading is the most common way to begin a section or subsection. Sometimes, though, a straightforward beginning is not the most efficient way to dive into a section or subsection. Consider a situation in which your heading contains a term that your audience doesn't understand. In this situation, you may want to begin with background information and then focus on the subject of the section.

> ***Downhole Steam Generator.*** More than half of the oil in a reservoir is too viscous to pump out with conventional methods. By heating these oils with steam and decreasing their viscosity, we can recover billions of gallons. For oils below 800 meters, the steam produced on the surface loses too much energy in transit to heat the oil. One way to overcome this

> problem is to use a downhole steam generator that applies hot steam directly.

In this example, the title of the subsection was a term, "downhole steam generator," that was unfamiliar to the audience. Instead of beginning the subsection with a repetition of that term, the writer chose to give background information that would allow the audience to understand the term. There are two important criteria for using this strategy. First, the background information should engage the audience. Second, the background information should be brief; it should quickly focus on the term contained in the subheading. If your background is long-winded, you will tax your readers' patience.

The following section uses all the techniques discussed so far to make transitions [Smith, 1993]. In the first paragraph, the writer begins with background information before quickly focusing on the section's topic—avoiding high altitude illness. This first paragraph also contains a mapping sentence for the subsections. Finally, each subsection begins with a straightforward sentence that repeats the subheading.

> **Avoiding High Altitude Illness**
>
> The sport of mountain climbing can involve dangers such as hanging from a precipice thousands of feet above the ground and weathering extremely cold temperatures; however, the simple act of breathing while at high altitude introduces a new class of dangers to the sport. High altitude illness can temporarily debilitate a climber and even lead to the climber's death. There are three common high altitude illnesses: acute mountain sickness, high altitude pulmonary edema, and high altitude cerebral edema. Knowledge of these three commonly reported illnesses can help prevent disaster in a mountain climbing expedition.
>
> ***Acute Mountain Sickness.*** Acute mountain sickness is the mildest of the three altitude illnesses. A case of this illness usually lasts four or five days after arrival at high altitude [Ward and others, 1989]. Victims of acute mountain sickness have symptoms such as headaches, listlessness, fatigue, and

drowsiness [Foster, 1983]. Doctors are not sure of the exact cause of this illness, although they believe that oxygen deprivation due to altitude is the starting mechanism [Heath and Williams, 1979].

Treatment of acute mountain sickness involves helping the victim adjust to high altitude [Ward and others, 1989]. Once the victim adapts to high altitude, the symptoms disappear. To prevent this illness, doctors recommend a slow and steady climbing pace [Foster, 1983]. Other preventive measures are to eat foods high in carbohydrates and to drink large amounts of liquids.

High Altitude Pulmonary Edema. High altitude pulmonary edema is an altitude illness in which fluid fills the lungs. Victims of this illness have usually ascended quickly to a high altitude and engaged in strenuous physical activity immediately after arrival. High altitude pulmonary edema occurs less often than the other illnesses; an incidence rate of only 2.5 percent was reported by a Mount Everest check station that stands at a 4,243 meter altitude [Ward and others, 1989]. Even though the incidence rate is relatively low, this illness can kill its victims in hours, warranting the attention of mountain climbers. Symptoms of high altitude pulmonary edema include the symptoms of acute mountain sickness along with cardiopulmonary symptoms such as cough, chest pain, and heart complaints [Lobenhoffer and others, 1982]. The causes of high altitude pulmonary edema are unknown, but doctors speculate that high pressures in the blood vessels of the lungs force fluid into the airways [Ward and others, 1989].

Decreasing altitude is the best method of treating this illness [Heath and Williams, 1979]. Medicines that force the body to expel fluid and combat infection are also used to treat this illness. Another treatment used by doctors involves breathing techniques that increase the pressure inside the lungs. Finally, preventing high altitude pulmonary edema involves three key measures: slow ascent, limited exertion at altitude, and abstinence from alcohol. Each of these measures minimizes stress on the cardiovascular system.

High Altitude Cerebral Edema. The third high altitude illness is high altitude cerebral edema. In this illness, the brain swells with fluid, creating pressure on the skull [Heath and Williams, 1979]. Damage to the brain from high pressure can be permanent, making high altitude cerebral edema the most

serious of the three illnesses discussed here. Victims of this illness show signs of acute mountain sickness early, as in the case of high altitude pulmonary edema [Ward and others, 1989]. After time, the victims become irritable and irrational, have hallucinations, and slip into unconsciousness.

The primary treatment of high altitude cerebral edema is, as with high altitude pulmonary edema, moving the victim to a lower altitude. Treatments also include medications administered to remove excess fluid from the brain. Similar to high altitude pulmonary edema, high altitude cerebral edema can be prevented by keeping a slow rate of ascent, and limiting activity after arrival at high altitudes.

Notice that each of the three subsections followed the same sequence of topics: description of illness, symptoms of illness, treatment of illness, and prevention of illness. Having the same sequence in each subsection helps smooth the transitions within the subsections because after the first subsection, the readers expect these details to come in a certain order.

Depth of Details

Depth is the level of detail that you, the writer, provide for a subject. Depth goes much deeper than just the number of details that you accumulate. Depth also includes the way in which you classify, analyze, and assess those details. For instance, if you reviewed the literature on predictions for how global warming will affect sea levels, you could write a paper that would simply classify the predictions done by others. Here you would state who predicted what and place each prediction in an appropriate category. A deeper review would go beyond classification to include an analysis of the predictions. For instance, in this deeper review, you could, as Houghton and Woodwell [1989] did, use predictions to calculate how an anticipated rise of 4–5 meters would affect the coastline of Florida. In the analysis, Houghton and Woodwell showed that most coastal cities, including Miami, Fort Myers, Daytona Beach, and St. Petersburg, would be submerged. In an even deeper review, you would not just analyze the measurements, but also assess the validity of the predictions. Here, you would establish criteria for deciding if or when each prediction was valid and then evaluate the predictions based on the criteria.

Choosing a proper level of detail is difficult because depth does not depend on just one variable. First, depth depends on format. Format determines depth in a simple way. If your format limits the number of words, then your depth is accordingly limited. For instance, if you have only one paragraph to discuss the problem of chlorofluorocarbon pollution, the depth might be as follows:

> Chlorofluorocarbons are man-made chemicals that are commonly used in water chillers, air conditioners, and aerosols in the refrigeration and electronics industries. Chlorofluorocarbons destroy the ozone layer and also contribute to the greenhouse effect. To reduce chlorofluorocarbon emissions, scientists are exploring three strategies: (1) substitutes for chlorofluorocarbons, (2) system designs that recycle chlorofluorocarbons, and (3) system designs that don't need chlorofluorocarbons.

In this example, the chemist brings out three related points: a definition of chlorofluorocarbons, the effect that chlorofluorocarbons have on the environment, and industry's response to these regulations.

Notice how the depth attributed to each point changes if the chemist has a page, rather than a paragraph, to communicate the information.

> Chlorofluorocarbons (CFCs) are man-made chemicals that are commonly used in water chillers, air conditioners, and aerosols in the refrigeration and electronics industries. CFCs are chemically similar to hydrocarbon atoms, except that hydrogen atoms are replaced by chlorine, fluorine, or bromine atoms. This substitution makes the CFCs chemically stable in the lower atmosphere. However, when these molecules drift to the upper atmosphere, they are broken down by ultraviolet light from the sun.
>
> In the upper atmosphere, there exists an ozone layer that serves as a protective shield against the sun's ultraviolet radiation [Downing, 1988]. Without this shield, harmful levels of ultraviolet radiation would strike the earth's surface causing injury and possible death to people, animals, and plants [Reitz, 1990]. When a chlorofluorocarbon molecule breaks down in the upper atmosphere, the free chlorine atom can begin a chain reaction that can destroy tens of thousands of ozone molecules. During the past decade, the ozone layer has shrunk by about 2.5 percent. Scientists have attributed this reduction to the presence of chlorofluorocarbons, which have been in use for the past fifty years [Reinhardt and Groeneveld, 1989].
>
> Because manufacturers weren't aware of the ozone depletion problem until only the last few years, they have not had time to produce many alternatives. After development of an alternative, about five to seven years of testing are needed before the chemical can be marketed. For that reason, most of the existing CFC substitutes are not available commercially. Equally important, many alternatives are not fully compatible with existing equipment.

Here, instead of one paragraph with three points, we have three full paragraphs. Notice that if the format allowed for an entire article on the subject, the writer could expand further and write a section instead of a paragraph for each point. In this further revision, the first section that gives the definition of chlorofluorocarbons could include illustrations and chemical equations.

The audience determines the level of detail in a more complicated fashion. First, the interest of the audience in the subject affects the depth. If the reader desires much depth about the topic, you are expected to provide it. However, as you present details about a subject, you also spark questions about the subject. For that reason, achieving a proper depth means finding a level such that you satisfy the reader's interest and anticipate the reader's questions. Consider the following three depths for the same topic:

Depth 1: The Environmental Protection Agency has tightened emission standards by 60 percent.

Depth 2: The Environmental Protection Agency has tightened emission standards from 0.25 g/hp-h to 0.1 g/hp-h.

Depth 3: The Environmental Protection Agency has tightened emission standards from 0.25 g/hp-h (grams of particulate/horsepower-hour) to 0.1 g/hp-h. The particulates include hydrocarbons, carbon monoxide, and nitrogen oxides. All three particulates are considered pollutants.

Of these three depths, the first is the most shallow because it gives the least amount of information, and the third depth is the deepest because it gives the most information. Although the second depth is deeper than the first depth, it is less successful because it raises unanswered questions—namely, what does the abbreviation "g/hp-h" mean? In a sense, this depth is simultaneously too shallow and too deep. Once you raise questions at a certain depth, you are obliged to answer those questions.

The technical level of the audience is a second way in which audience affects depth. The more technical the audience, the more quickly you can achieve a technical depth because with a technical audience, you need not provide as much background as you do with a non-technical audience.

A third way in which audience determines depth has to do with the purpose of the document. For instance, in an informative paper about how effective photorefractive keratectomy has been at correcting nearsightedness, you present the results of the procedure: what percentage achieved normal vision, what percentage achieved significantly improved vision, what percentage had complications, what percentage experienced regression after a year. However, in a paper arguing for approval of the technique, you go deeper to include rebuttal arguments for the problems that the procedure has. You would also include a discussion about the advantages that photorefractive keratectomy has over alternatives such as radial keratotomy.

One quick check for the depth of a document is to examine the lengths of paragraphs and sections. In general, the longer the paragraphs and sections, the greater the depth that is achieved. When paragraphs and sections are short, the initial impression given to the audience is that the document lacks depth. In some cases, though, the audience doesn't expect much depth. For example, in a set of instructions the audience is primarily concerned with the surface question "how" rather than the deeper question "why." For that reason, instructions often have short sections and short paragraphs that answer the question of "how," but do not engage the question of "why." In contrast, journal articles and formal reports confront both questions. Correspondingly, the sections and paragraphs of those documents are longer.

Can sections and paragraphs be too long? In scientific writing, the answer is yes. Although a fiction writer such as William Faulkner can pull off a four-page paragraph, a scientific writer cannot. A scientific writer has to divide the information into digestible portions separated by white space. Otherwise the reader tires, and the efficiency of understanding goes down.

Note that once you establish a depth in discussing a topic, readers expect you to maintain that depth for the discussion of related topics. That balance of depth is particularly important in comparisons, such as the comparison of altitude sicknesses in the previous section.

Emphasis of Details

In any description, a writer will present details that have varying degrees of importance. In some kinds of writing, fiction for instance, emphasis of details is not so important. In fact, a good mystery writer will often bury an important detail. In scientific writing, though, scientists and engineers should present details in such a way that readers understand their relative importance. Emphasizing details is not necessarily difficult; however, many scientists and engineers fail to emphasize details properly in their documents. In fact, lack of emphasis is probably the most common structural problem in scientific writing. How do you go about emphasizing details? To emphasize a detail, you have several means: repetition, wording, illustration, and placement.

Emphasizing Details With Repetition. If you mention a particular result once in your summary, a second time in your discussion, and then a third time in your conclusion, your readers will realize its importance. Repeating important results in a document is not being redundant. You are redundant when you repeat something unimportant. Redundancies, which do not serve a document in any way, usually occur within phrases: "bright green in color," "fundamental basics," or "already existing." In such cases, the phrase could be tightened without loss of meaning: "bright green," "basics," and "existing."

Repeating important details in a document serves a document because it increases the likelihood that readers will retain the important details. Readers don't retain every detail in a document. Studies show that people remember only about 10 to 20 percent of what they read [Felder and Stice, 1992]. Mentioning a detail two or three times in the document helps increase that percentage. Advertisers know the value of repetition. Next time you watch a television commercial, count how many times the commercial repeats the product's name. Don't be surprised if you either hear or see the name five or more times.

The typical organization of most scientific documents gives you the opportunity to use repetition. In the

informative summary you have your first opportunity to mention the detail. A second opportunity occurs in the discussion of the work, and a third opportunity occurs in the conclusion. Even in a document with no informative summary, you have at least two opportunities (the discussion and conclusion) for mentioning important details. Those opportunities you should not miss.

Emphasizing Details With Wording. Many details in scientific documents float, ungrounded, because the author has not shown why the details have been included:

> One of the panels on the north side of the solar receiver will be repainted with Solarcept during the February plant outage.

What is the most important detail in the sentence? Is it that the panel is on the north side? Is it that the panel is being repainted with Solarcept? Is it that the repainting will occur during the February plant outage? The problem with this sentence is that you don't know. All details have the same weight. In this example, prepositional phrases are overused. Prepositional phrases list details, but do not give details any relative emphasis. Details linked by prepositional phrases all have the same amount of importance.

In strong scientific writing, the writer anchors the details by giving reasons for their inclusion:

> Because the February plant outage gave us time to repair the north side of the solar receiver, we repainted the panels with Solarcept, a new paint developed to increase absorptivity.

In this revision, readers have an easier time assessing the importance of the details because readers can see why the details are included. While wording without emphasis overuses prepositional phrases, wording with emphasis judiciously uses *dependent clauses* and *infinitive phrases*.

Dependent clauses are clauses that begin with introductory words such as "because," "since," "as," "although," and "when."

> Because the February plant outage gave us time to repair the north side of the receiver,...

Infinitive phrases are *verb* phrases that begin with the word "to."

> ...to repair the north side...to increase absorptivity.

Wording details through dependent clauses and infinitive phrases helps show the relationship and relative importance of details.

Emphasizing Details With Illustration. Another way to accent a detail is through illustration. In a document, readers often don't read every sentence. Although scientific readers don't read every sentence, they almost always look at every illustration. Therefore, if you can place important results in an illustration, do so. For example, Figure 3-1 shows how much radiation the average person in the United States receives from the operation of nuclear power plants as opposed to other sources. These other sources include natural sources (such as radon) and medical sources (such as dental x-rays). Illustrations such as Figure 3-1 stand out in papers and reports. You should realize, though, that a large number of illustrations dilutes the importance given to any one. If Figure 3-1 was one of ten such pie graphs, it would not receive much emphasis.

Emphasizing Details With Placement. Certain places in a document receive more emphasis than others. For instance, text that borders white space receives more emphasis than text that borders other text. For this reason, the titles and headings receive emphasis because they are surrounded by white space (line breaks before and after). Likewise, the beginnings and endings of sections also re-

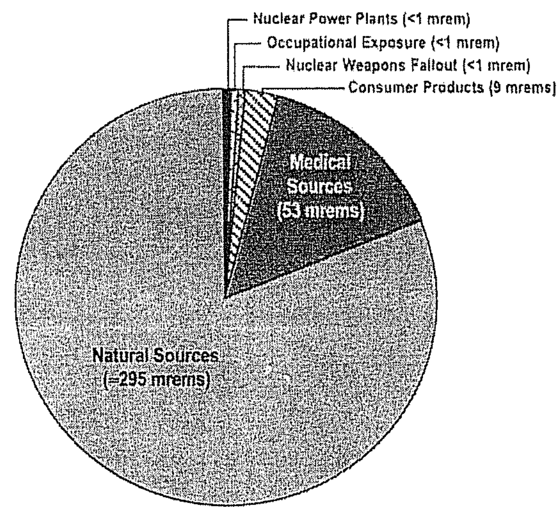

Figure 3-1. The breakdown of annual radiation dosage to the average person in the United States from all sources [*Radiation*, 1994]. Most of the contribution comes from natural sources, such as radon and cosmic radiation.

ceive emphasis because they are bounded, either above or below, by white space.

Other places in documents receive emphasis because of white space, but to a lesser extent. For instance, the beginnings and endings of paragraphs receive emphasis because of the white space given by the tab at the beginning of paragraphs and by the white space at the end of the paragraph's last line.

In addition to using white space for emphasis, you can also use the lengths of sentences and paragraphs. For example, a short sentence following a long sentence receives emphasis, particularly if that short sentence is the last sentence of the paragraph. Likewise, a short paragraph following a long paragraph receives emphasis. In the following example, notice how the Warren Commission [1964] used a combination of short sentences and placement at the end of the second paragraph to emphasize the name of the man in the lunchroom.

> When the shots were fired, a Dallas motorcycle patrolman, Marrion L. Baker, was riding in the motorcade at a point several cars behind the President. He had turned right from Main Street onto Houston Street and was about 200 feet south of Elm Street when he heard a shot. Baker, having recently returned from a week of deer hunting, was certain the shots came from a high-powered rifle. He looked up and saw pigeons scattering in the air from their perches on the Texas School Book Depository Building. He raced his motorcycle to the building, dismounted, scanned the area to the west and pushed his way through the spectators toward the entrance. There he encountered Roy Truly, the building superintendent, who offered Baker his help. They entered the building, and ran toward two elevators in the rear. Finding that both elevators were on an upper floor, they dashed up the stairs. Not more than 2 minutes had elapsed since the shooting.
>
> When they reached the second-floor landing on their way up to the top of the building, Patrolman Baker thought he caught a glimpse of someone through the small glass window in the door separating the hall area near the stairs from the small vestibule leading into the lunchroom. Gun in hand, he rushed to the door and saw a man about 20 feet away walking toward the end of the lunchroom. The man was empty-handed. At Baker's command, the man turned and approached him. Truly, who had started up the stairs to the third floor ahead of Baker, returned to see what had delayed the patrolman. Baker asked Truly whether he knew the man in the lunchroom. Truly replied that the man worked in the building, whereupon Baker turned from the man and proceeded, with Truly, up the stairs. The man they encountered had started working in the Texas School Book Depository Building on October 16, 1963. His fellow workers described him as very quiet—a "loner." His name was Lee Harvey Oswald.

Placement can work in the opposite way: Placing important information in the wrong place can greatly reduce the chances that the audience will remember that information. For instance, many scientists and engineers bury important details in the middle of paragraphs.

> This report uses data from both the test and evaluation and power production phases to evaluate the performance of the Solar One receiver. Receiver performance includes such receiver characteristics as point-in-time steady state efficiency, average efficiency, start-up time, operation time, operations during cloud transients, panel mechanical supports, and tube leaks. Each of these characteristics will be covered in some detail in this report.

Now that you've read this paragraph, close your eyes and name as many receiver characteristics as you can that will be covered in the report. Did you remember all seven items of the list? As stated in the previous chapter, people remember things in groups of twos, threes, and fours. The list here was too long. Also a problem was that the list occurred in the middle of the paragraph. A better way to emphasize this information would be to group those characteristics and then place the list in a location, perhaps the end of the paragraph, that receives more emphasis.

> This report uses data from both the test and production phases to evaluate the performance of the Solar One receiver. In this report, we will evaluate performance by studying the receiver's efficiency, operation cycle, and mechanical wear.

You might ask why not break out of the paragraph form with the list and format it vertically down the page. Because of the additional white space, this vertical list would certainly receive more emphasis. Although vertical lists serve some types of documents such as instructions and résumés, too many vertical lists disrupt the reading in journal articles and reports, in much the same way that traffic lights slow the driving through a city. Such disruptions make it difficult to read through longer documents. If the list is truly important, you might format it vertically. However, if you have more than one vertical list for every two or three pages of text, you should reconsider. Too many vertical lists will make your document appear like an outline.

Lists, particularly when they are long, are notorious for burying information. The following is a list of recommendations from Morton Thiokol to NASA on improvements needed for the solid rocket booster of the space shuttle. The list comes from a briefing that preceded the space shuttle *Challenger* disaster by over five months. Because the list was long, the emphasis given to the first recommendation was diluted [*Report*, 1986].

Recommendations

- The lack of a good secondary seal in the field joint is most critical and ways to reduce joint rotation should be incorporated as soon as possible to reduce criticality.
- The flow conditions in the joint areas during ignition and motor operation need to be established through cold flow modeling to eliminate O-ring erosion.
- QM-5 static test should be used to qualify a second source of the only flight certified joint filler material to protect the flight program schedule.
- VLS-1 should use the only flight certified joint filler material in all joints.
- Additional hot and cold subscale tests need to be conducted to improve analytical modeling of O-ring erosion problem.
- Analysis of existing data indicates that it is safe to continue flying existing design as long as all joints are leak checked with a 200 psig stabilization pressure, are free of contamination in seal areas and meet O-ring squeeze requirements.
- Efforts need to continue at an accelerated pace to eliminate SRM seal erosion.

In addition to the list being too long, Richard Feynman [1988] pointed out that there is a contradiction between the sixth item and the first.

How could the important details of this list be better emphasized? One improvement would have been to make a short list of the two or three most important recommendations followed by a list of the secondary recommendations on a separate page. Another improvement would have been to rework the language. The sentences are full of imprecision and needless complexity. For instance, in the first recommendation, what did the writer mean by the phrase "most critical"? There's no middle ground with the word "critical." Something is either critical or it isn't. Other problems with the language include wordiness, discontinuities, and needless passive voice.

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Chapter 4

Language: Being Precise

When a writer conceives an idea he conceives it in a form of words. That form of words constitutes his style, and it is absolutely governed by the idea. The idea can only exist in words, and it can only exist in one form of words. You cannot say exactly the same thing in two different ways. Slightly alter the expression, and you slightly alter the idea.

—Arnold Bennett

In scientific writing, precision is the most important goal of language. If your writing does not communicate exactly what you did, then you have changed the work. One important aspect of precision is choosing the right word. Another important aspect of being precise is choosing the appropriate level of accuracy. Just as you wouldn't assign the wrong number of significant digits to a numeral in a calculation, so shouldn't you assign an inappropriate level of accuracy to details in your writing. The appropriate level of detail depends upon your work and your audience.

Choosing the Right Word

As a scientist or engineer, you wouldn't choose the word "weight" when you meant "mass." Technical terms such as "weight" and "mass" have specific meanings.