

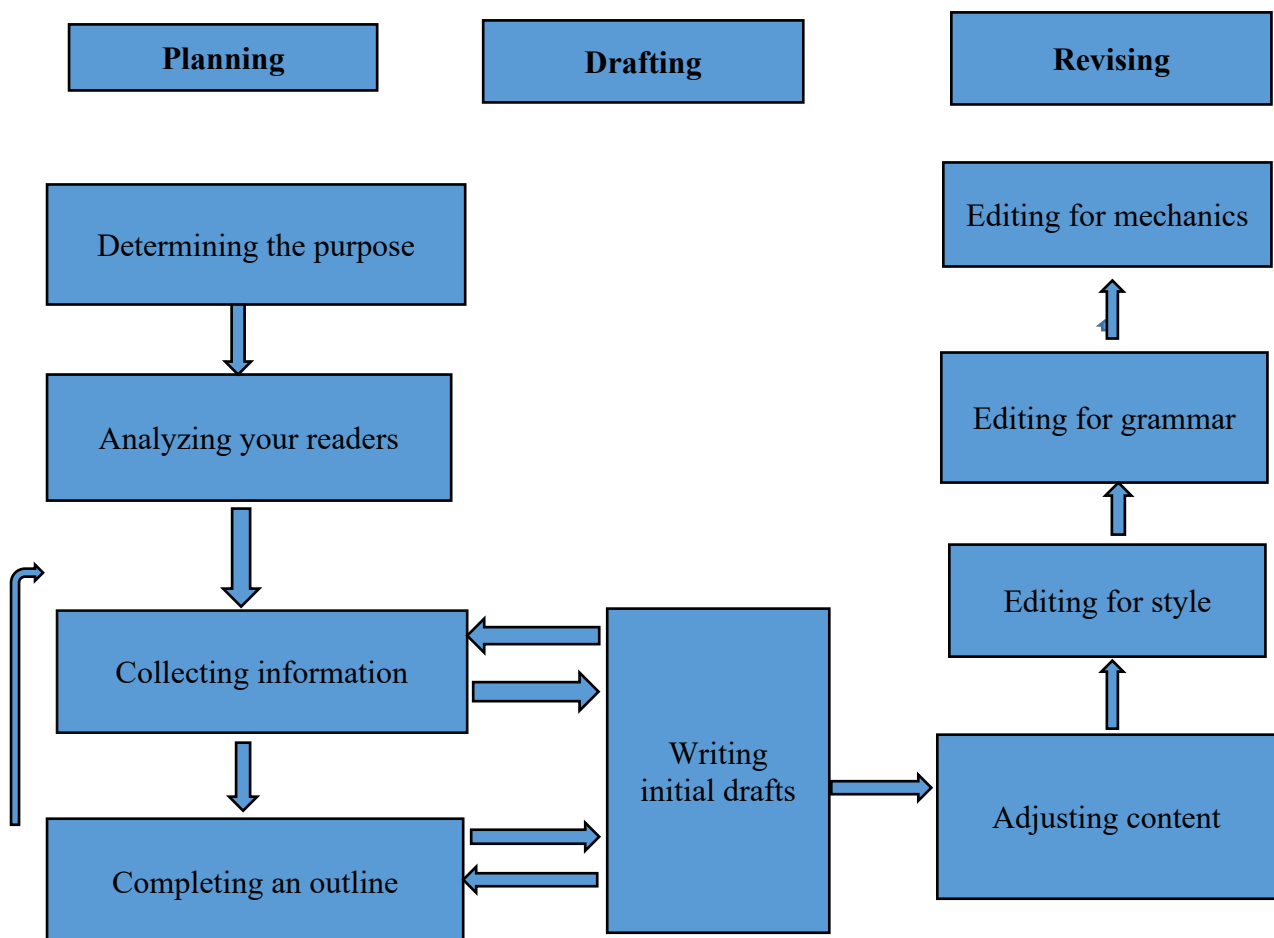
THE TECHNICAL WRITING PROCESS

Effective writing is time consuming. Inexperienced professionals commonly err by allowing inadequate time to prepare their reports properly. The technical writing process should not be a concentrated effort; rather, it should be several smaller efforts separated in time to help you organize your ideas. It is most efficient to begin writing the components of a report as you complete the phases of your work project so that when you are ready to write the report, parts of it may be ready for rewriting and editing for the final draft.

Technical writing, more than literary and journalistic writing, is a recursive process. As components of a report are completed, information presented in earlier sections may need to be supplemented, revised, or deleted so that these components become the natural results of this information.

The Writing Process

Technical writing comprises three steps: planning, drafting, and revising. As shown in the figure, these steps are further divided into sub steps that is followed in completing most technical communication.



Analyzing Purpose

Whenever you write, some clear purpose should guide your efforts. If you don't know why you're writing, there's a good chance that your reader won't either. Fulfilling an assignment doesn't qualify as a real writing purpose, although it may well be what sends you to your desk. An authentic purpose, however, requires you to answer this question: **What do I want this piece of writing to do for both my reader and me?** Knowing your reason, or purpose, for writing a particular document is essential to its success.

Writing is done for a purpose, and to accomplish something. A document has two purposes:

The writer's purpose:

Why the writer is writing the document?

What the writer wants the reader to know and do?

The reader's purpose:

Why is the reader reading?

What the reader wants to know or do?

A writer may have one of the following purposes if writing a technical document:

1. To Instruct: If you are writing to instruct, things to consider are:

- The purpose of the procedure/task
- How to perform a task/procedure (all the steps)
- Why it should be done
- Special conditions that affect the procedure

Example Documents: Training and operator manuals, policy and procedure statements, consumer instructions, etc.

2. To record: Things to consider are:

- Tests or research performed and results
- Decisions made and responsibilities assigned
- Actions and their consequences

Example Documents: Minutes, file reports, lab reports, etc.

3. To Inform (for decision making): Things to consider are:

- Accurate information and thorough data analysis to enable the reader to make decisions
- Specific facts

Example Documents: Progress reports, performance evaluation, feasibility reports, investigative reports, etc.

4. To Inform (without decision making): Things to consider are:

- The specific who, what, where, when, why, and how of the subject
- A sequence of events showing cause and effect
- The relationship of the information to the company's interest

Example Documents: Information bulletins, literature reviews, product descriptions, process explanations, etc.

5. To recommend: Things to consider are:

- Reasons for the recommendation
- Expected benefits
- Why the recommendation is preferable to an alternative

Example Documents: Simple proposals, feasibility studies, recommendation reports, etc.

6. To persuade: Things to consider are:

- Sound evidence
- Counter arguments

- Importance of the action suggested
- Consequences of not taking the suggested action
- Benefits

Example Documents: Construction bids, grant applications, technical news release, reports dealing with sensitive topics, etc.

You can consider the following questions to determine the reader's purpose:

- a. What action (or decision) do I want my reader to take (make)?
- b. How does the reader intend to use this document?
- c. What effect will this document have on the reader?
- d. Do my purpose and my reader conflict in any way?

Write the purpose statement before you begin your research for material.

Determining and Analyzing Document Type

What specific document type is required or will be appropriate. Search for the internationally accepted standards regarding format and organization

Analyzing the Writing Situation/Context

No writer works in isolation. Employees work in a certain organizational environment which may have a particular communication atmosphere, preferences for specific documents, formats, or types of information, the organizations relationship with externals, government regulations, professional standards or ethical codes the organization follows, etc. In analyzing your writing situation, consider these questions:

1. Is the subject controversial within the organization?
2. What events created the need for this document?
3. What continuing events depend on this document?
4. Given the deadline for this document, what information can be included?
5. What influence will this document have on company operations or goals?
6. Is the subject under the control of a government agency or specific regulations?
7. What external groups are involved in this subject, and why?

Analyzing Audience

The audience of a technical report—or any piece of writing for that matter—is the intended or potential reader or readers. For most technical writers, this is *the most important* consideration in planning, writing, and reviewing a document. You "adapt" your writing to meet the needs, interests, and background of the readers who will be reading your writing.

To communicate effectively and maintain receptivity in the readers, a good writer generates an audience profile before writing. In this way, s/he can select style, language, organization, and form of expression suitable and appropriate for the target readers.

Technical Readers

Unlike most of the other types of writings, audiences of technical writing are

- Well- defined
- Sometimes writers may have personal knowledge of the reader(s)
- Technical readers have a professional or organizational responsibility to read the material

The readers of technical documents will fall into one or more of the following categories:

Reader	Purpose
Executives	To make decisions based on applicability, and profitability. They want conclusions and alternatives rather than details.
Technologists, engineers, & scientists	Interested in information transfer. They need facts, details, theory, methodology, and conclusions.
Technicians	Need information to troubleshoot, modify, upgrade, and maintain or repair equipment. They need practical information in format that is easy to use. To facilitate understanding, they rely on visuals.
Operators	Need instructions to operate equipment or to perform procedures. They need a set of easy to understand commands in a step by step format with visuals.
Non-technical persons	They read for interest and information

Activity 1:

Match the writers below with their correct target readers:

Writer	Readers
Computer specialist designing a computer system for a bank	Supervisors and drug manufacturers
Chemist writing a report about tests on a certain drug	The company, bank managers, city engineers, etc.
Consulting engineer writing a report recommending a water storage system for a city.	Supervisors, managers of the bank, and the programmers who will have to learn the new system.

Conducting audience analysis and generating an audience profile

Questions to consider are:

1. Who is/are my specific reader(s)?
2. What is the position of the reader(s) in the organization or are they external?

External: outside the organization	Internal: inside the organization
Customers, vendors, stockholders, employees of government agencies or industry associations, competitors, and the general public.	<ul style="list-style-type: none"> • Supervisors: executives who make decisions based on information in the document. Supervisors who may be semi experts. • Subordinates: they rank lower than the writer. • Peers: equals.

Activity 2:

What issues will you discuss and emphasize when writing in the following scenarios? Match the following:

If you are writing a report to superiors about a new company computer system, your readers would be interested in...	How the system will link departments and functions, change current procedures, and support company or department goals
If the same report is meant for peers, you may focus on...	Overall costs, the effect of the system on company operations, expected benefits

	company wide, and projections of future computer uses and needs
If the same report is for subordinates, you will probably emphasize information about...	Specific models and programs, locations for the new computers, how these computers support specific tasks and systems, and how the readers will use the computers in their jobs.

3. Why do they need this document?

Usually, technical readers read to gain information. For a writer, an important issue to investigate is

- What particular information does the reader need?
- Why does s/he need it?
- Considering readers' needs, what material would be appropriate, and what sequence would be the most suitable one?

Activity 3:

Match the following by analyzing the readers and the order of material most suitable for them.

Readers	Order of material
A decision maker	A brief summary of recommendation from the investigation.
A dissertation advisor	The answer or the conclusion first.
An engineering manager	A retracting of steps of a research or development procedure with answers at the end.

4. How will they use it?

Technical documents usually are not read, nor are meant to be read, from the beginning to the end like a mystery novel. Readers may be interested in specific information in the document depending on their needs and reading habits.

Activity 4:

What sections of the technical document (manual, reports, brochures) would the following readers be interested in? Choose from the options in the box and also explain why?

<ul style="list-style-type: none"> • Summaries or abstracts • Specific sections of the document: (correct operating procedures, section on maintenance, description of machines) • The entire document

- a customer trying to decide what automobile to buy
- an executive
- a service technician
- someone who opposes the project
- someone who needs to change an automobile tire
- a psychologist searching for research studies about abused children

5. Do they have a hostile, friendly, or neutral attitude towards the subject?

Considering this question will help you in deciding upon techniques for being persuasive and assertive.

Activity 5:**Match the following:**

Readers	Techniques
A person with a negative attitude about the subject	Adjusting your document to match international standards
a reader with strong personal preferences regarding formats	Using lists, headings, indexes and other design features to make the text more useful and emphasizing the importance of suggested action
A reader reluctant to read and act	Organizing information from generally accepted to less accepted data or from shared goals to opposing points

6. What is the level of their technical knowledge about the subject?

Expert level	Semi expert level	Non expert level
They require few definitions and explanations of principles.	They may vary a great deal in how much they know and why they want information. They will require more definitions and explanations of general principles than the expert reader does.	They have no specialized training or experience in the subject. Usually, they are given a glossary of technical terms, checklists of important points, simple graphics, and summaries.

Activity 6:

How may you describe the following readers?

1. A manager who understands some engineering principles in a report but probably is more interested in information about how the project affects company planning and budget subjects in which the manager is an expert.
2. A person reading a document to learn how to install a heat lamp in the bathroom.
3. A marketing manager reading a report explaining possible strategies for selling a home appliance in selected regions of the country.
4. An equipment operator who knows little about the scientific basis of a piece of machine but is more interested in information about handling the equipment properly.
5. A person reading an article in a general science magazine about the disappearance of the dinosaurs from earth.
6. A scientist who wants to duplicate a new genetic test, and so wants information about every step in the test.

Multiple Readers

Primary readers	Secondary readers
They are the people for whom the document is originally intended and written. They will take action or make decisions based on the document. Primary readers can be one or many.	They might be affected or influenced by the document.

For multiple primary readers, the following steps may be useful:

1. Precede all information with headings that direct different readers to sections of the report relevant to them.

2. Write a different cover letter that emphasizes the relevant sections of the report and add any other relevant information.
3. Sometimes you may be required to separate, similar report for each audience.

Adapting your writing to meet your audience's needs

Once you've analyzed your audience, how do you use this information? How do you keep from writing something that may potentially still be incomprehensible or useless to your readers? Draft your document with your audience's needs in mind, but remember that writing can be refined over many drafts. With each subsequent draft, think more carefully about your readers, and revise and edit your document so that you make technical information more understandable for non-specialist audiences. The lists below are some of the ways you can adapt your writing to your audience's needs.

The following "controls" have mostly to do with making technical information more understandable for non-specialist audiences and is information you will refine as you begin to put your final report together. However, it is a good idea to be aware of your audience's needs even in the early stages of your report drafting.

1. Provide the right information

Add information readers need to understand your document. Check to see whether certain key information is missing—for example, a critical series of steps from a set of instructions; important background that helps beginners understand the main discussion; definition of key terms.

Omit information your readers do not need. Unnecessary information can also confuse and frustrate readers—after all, it's there so they feel obligated to read it. For example, you can probably chop theoretical discussion from basic instructions.

Change the level of the information you currently have. You may have the right information but it may be "pitched" at too high or too low a technical level. It may be pitched at the wrong kind of audience—for example, at an expert audience rather than a technician audience. This happens most often when product-design notes are passed off as instructions.

Add examples to help readers understand. Examples are one of the most powerful ways to connect with audiences, particularly in instructions. Even in a non-instructional text, for example, when you are trying to explain a technical concept, examples are a major help—analogies in particular.

Change the level of your examples. You may be using examples but the technical content or level may not be appropriate to your readers. Homespun examples may not be useful to experts; highly technical ones may totally miss your non-specialist readers.

2. Guide your reader through your writing

Change the organization of your information. Sometimes, you can have all the right information but arrange it in the wrong way. For example, there can be too much background information up front (or too little) such that certain readers get lost. Sometimes, background information needs to be consolidated into the main information—for example, in instructions it's sometimes better to feed in chunks of background at the points where they are immediately needed.

Strengthen transitions. It may be difficult for readers, particularly nonspecialists, to see the connections between the main sections of your report, between individual paragraphs, and sometimes even between individual sentences. You can make these connections much clearer by adding *transition words* and by echoing *key words* more accurately. Words like "therefore," "for example," "however" are transition words—they indicate the logic connecting the previous thought to the upcoming thought. You can also strengthen transitions by carefully echoing the same key words. A report describing new software for architects might use the word software several times on

the same page or even in the same paragraph. In technical prose, it's *not* a good idea to vary word choice—use the same words so that people don't get any more confused than they may already be.

Write stronger introductions—both for the whole document and for major sections. People seem to read with more confidence and understanding when they have the “big picture”—a view of what's coming, and how it relates to what they've just read. Therefore, write a strong introduction to the entire document—one that makes clear the topic, purpose, audience, and contents of that document. And for each major section within your document, use mini-introductions that indicate at least the topic of the section and give an overview of the subtopics to be covered in that section.

Create topic sentences for paragraphs and paragraph groups. It can help readers immensely to give them an idea of the topic and purpose of a section (a group of paragraphs) and in particular to give them an overview of the subtopics about to be covered. Road maps help when you're in a different state!

3. Craft effective sentences

Change sentence style and length. How you write—down at the individual sentence level—can make a big difference too. In instructions, for example, using imperative voice and “you” phrasing is vastly more understandable than the passive voice or third-personal phrasing. For some reason, personalizing your writing style and making it more relaxed and informal can make it more accessible and understandable. Passive, person-less writing is harder to read—put people and action in your writing. Similarly, go for active verbs as opposed to *be* verb phrasing. All of this makes your writing more direct and immediate—readers don't have to dig for it. And obviously, sentence length matters as well. An average of somewhere between 15 and 25 words per sentence is about right; sentences over 30 words are to be mistrusted.

Edit for sentence clarity and economy. This is closely related to the previous “control” but deserves its own spot. Often, writing style can be so wordy that it is hard or frustrating to read. When you revise your rough drafts, put them on a diet—go through a draft line by line trying to reduce the overall word, page, or line count by 20 percent. Try it as an experiment and see how you do. You'll find a lot of fussy, unnecessary detail and inflated phrasing you can chop out.

4. Make your document visually appealing

Add and vary graphics. For non-specialist audiences, you may want to use more graphics—and simpler ones at that. Graphics for specialists are more detailed, more technical. In technical documents for non-specialists, there also tend to be more “decorative” graphics—ones that are attractive but serve no strict informative or persuasive purpose at all.

Break text up or consolidate text into meaningful, usable chunks. For non-specialist readers, you may need to have shorter paragraphs. Maybe a 6- to 8-line paragraph is the usual maximum. Notice how much longer paragraphs are in technical documents written for specialists.

Add cross-references to important information. In technical information, you can help non-specialist readers by pointing them to background sources. If you can't fully explain a topic on the spot, point to a section or chapter where it is.

Use headings and lists. Readers can be intimidated by big dense paragraphs of writing, uncut by anything other than a blank line now and then. Search your rough drafts for ways to incorporate headings—look for changes in topic or subtopic. Search your writing for listings of things—these can be made into vertical lists. Look for paired listings such as terms and their definitions—these can be made into two-column lists. Of course, be careful not to force this special formatting, and don't overdo it.

Use special typography, and work with margins, line length, line spacing, type size, and type style. For non-specialist readers, you can do things like making the lines shorter (bringing in the

margins), using larger type sizes, and other such tactics. Typically, sans-serif fonts, such as Ariel, are useful for online readers. Serif fonts, such as Time New Roman, are useful for print texts.

By now you should be able to see that many of the decisions you make as a technical writer depend on who will read your report. From content, to language, to layout, every aspect of your communication must keep your reader's needs in mind.

Activity 7: Read the given documents and answer the given question:

1. Identify the target audience for each document (executives, engineers/technologists, or technicians).
2. Discuss how the document addresses their specific needs and purposes (e.g., decision-making, technical understanding, or practical troubleshooting).
3. Examine differences in tone, language, and detail.
4. Note the inclusion of visuals, step-by-step instructions, or high-level summaries tailored to each audience.
5. What information is prioritized for each audience, and why?
6. How does the structure (e.g., executive summary, technical diagrams, or troubleshooting guides) cater to the readers' needs?
7. How does the writer's choice of language (connotative or denotative) align with the audience's technical knowledge?
8. Discuss findings with classmates or present analyses to the class, highlighting how the documents effectively (or ineffectively) adapt to their respective audiences.

Topic: Artificial Intelligence in Healthcare

Excerpt 1:

Artificial Intelligence (AI) in healthcare can enhance operational efficiency and patient outcomes. By automating administrative tasks, AI reduces costs by up to 30%, allowing healthcare providers to allocate resources more effectively. Predictive analytics tools driven by AI can forecast patient needs, enabling proactive interventions. This document explores ROI projections, implementation challenges, and strategic opportunities for integrating AI into healthcare systems.

Excerpt 2:

The integration of AI in healthcare involves using machine learning algorithms to analyze large datasets for predictive diagnostics. A convolutional neural network (CNN) can process medical imaging data, identifying anomalies with 92% accuracy. The implementation requires an infrastructure supporting real-time data processing, with TensorFlow and PyTorch as recommended frameworks. Detailed schematics and data flow diagrams are provided for system integration.

Excerpt 3:

When an AI diagnostic tool flags errors, first verify the dataset input for inconsistencies, such as missing or mislabeled fields. Refer to the troubleshooting flowchart on page 3 for common issues like algorithm calibration or hardware connectivity. Regular system updates, as outlined in the maintenance guide, ensure accurate model predictions. Visual aids and step-by-step instructions are included for quick resolution.

Activity 8: For each of the following tasks:

- **Identify your audience (i.e. "who is the audience?")**
- **Identify your purpose (i.e. "why is the report needed?")**
- **Identify your audiences expectations (i.e. "why is the audience reading this report?")**

- Summarize your strategy (i.e. “how should the report be written based on the above three points?”)

(a) Analyze the failure of component X in GizmoJ, and report your findings to the GizmoJ engineering team.

Audience: i. purpose:ii. Position:

iii. Technical knowledge:

Writer Purpose:

Strategy:

(b) Analyze the failure of component X in GizmoJ, and report your findings to the GizmoJ PR spokesperson.

Audience: i. purpose:ii. Position:

iii. Technical knowledge:

Writer Purpose: :

Strategy:

(c) Present your preliminary design concept to your department manager.

Audience: i. purpose: _____ ii. Position: _____

iii. Technical knowledge: _____

Writer Purpose: _____

Audience Purpose: _____

Strategy: _____

(d) Present your preliminary design concept to a group of venture capitalists and investors.

Audience: i. purpose: _____ ii. Position: _____

iii. Technical knowledge: _____

Writer Purpose: _____

Audience Purpose: _____

Strategy: _____

Activity 9: Imagine that you have an audience of real estate developers and sales representatives for whom you are writing an informational report on solar devices, which they are considering as options on housing within a new development. **Decide which of the following topics you’d select for this specific audience and how you’d discuss the selected topics.**

- Basic components of a solar device
- Current research in solar device technology
- Costs to purchase, operate, and maintain solar devices
- Historical background on the use of solar power
- Architectural considerations in using solar devices
- How to determine angle of inclination for a collector
- Basic operation of a solar device
- A survey of solar device manufacturers
- Results of consumer tests on solar devices
- Economics of solar power
- Dynamics of heat transfer

- Tax programs to benefit users of solar power
- Comparison to other common energy sources

Activity 10: Analyze the technical document provided below for:

i. Audience

ii. Purpose

Date: February 24, 2018

To: Muhammad Ali, Office Coordinator

From: Jonathan, Word Processing Operator

Subject: New Word Processing Software

Introductory Summary

As you requested, I have examined the WordWonder word processing software we are considering. On the basis of my observations, I recommend we secure one copy of WordWonder and test it in our office for two months. Then after comparing it to the other two packages we have tested, we can choose one of the three word processing packages to use throughout the office.

Features of WordWonder

As we agreed, my quick survey of WordWonder involved reading the user's manual, completing the orientation disk, and meeting with a salesperson from the company. Here are the four features of the package that seemed most relevant to our needs:

1. **Formatting Flexibility:** WordWonder includes diverse "style sheets" to meet our need in producing reports, proposals, letters, memos, articles, and even brochures. By engaging just one command on the keyboard, the user can change style sheets- whereby the program will automatically place text in a specified format.
2. **Mailers:** For large mailings, we can take advantage of WordWonder's "Mail Out" feature that automatically places names from mailing lists on form letters.
3. **Documentation:** To accommodate our staff's research needs, WordWonder has the capacity to renumber and rearrange footnotes as text is being edited.
4. **Table of Contents:** WordWonder can create and insert page numbers on tables of contents, created from the headings and subheading in the text.

Conclusion

Though I gave WordWonder only a brief look, this survey suggests that it may be a strong contender for use in this office. If you wish to move to the next step of starting a two-month office test, let me know. Then arrangements will be made with the manufacturer for receiving a complimentary trial copy.

Activity 11:

Rewrite the following flawed correspondence. Be sure to achieve effective audience understanding and involvement. To do so, avoid sexist language and define high-tech term. Search online to find any abbreviations or acronyms that need defining. Remember: Though the immediate readers might understand all the high-tech terminology, other readers might not. These additional audiences could include lawyers, employees from other departments, or low-tech clients.

West Central Auditors

"Your Technical Engineering and Energy Resource Experts"

1890 River

Pocato, Idaho 89902

Marsh 12, 2022

Marks-McGraw, Inc.
2145 Oceanview
Clackamas, Oregon

Gentlemen:

We will visit your plant next week for the TEA. To ensure that our visit goes smoothly, we plan this procedure:

- Your plant foreman will have his engineer assemble his CAD drawings for the power plant at Brush Prairie.
- Our men will review these drawings against TE specs, such as specific cost estimates for energy usage and energy data.
- Our ER group will then help your men plan and prepare your facilities for technology changes mandated by the DOE's office of the EERE.
- We also want to review your engineer's plans for any building envelopes. Make sure he brings all relevant correspondence he has had with his clients.

This audit should take approximately seven man-hours. It's a huge job. If we have to go off site for lunch or breaks, the job will take even longer. Therefore, please ask secretary to provide drinks and food for our six representatives. Tell her that we have no dietary concerns, so anything she provides will be greatly appreciated.

Sincerely,

Jim Wynn, Team Manager

Activity 12:

In small groups composed of individuals from like majors, list 10 high-tech terms (jargon, acronyms, or abbreviations) unique to your degree programs. Then, envisioning a lay audience, parenthetically define and briefly explain these terms. Also, define these terms through brief explanation.