Online Technical Writing: Planning Reports—Outlining

This section shows you an important technique for the early stages of your report-writing project: developing a detailed outline for a report project

Outlining stage

When you write a technical report, not only must you think of the right information to include (or exclude); you must also find a good way to arrange it. The first task involves invention (or brainstorming) and narrowing; the second, outlining.

Outlines for technical reports are usually hard to handle solely in your mind; it's a little like trying to add a list of large numbers in your mind. You must get report outlines on paper in order to think about the arrangement of the topics within them. A good working outline serves you in at least four important ways:

- It shows you which areas of information to investigate and gather information on.
- It shows you which areas you can safely ignore (thus saving you plenty of time).
- It enables you to schedule your work into manageable units of time.
- It gives you a "global" view of your report project, an overall sense of the contents, parts and organization of the report.

Exploratory reading. If you have trouble getting started on the rough outline, do some exploratory reading in nonspecialist encyclopedias, introductory chapters of general audience books, or articles in science magazines for nonspecialists. If necessary, move on from these resources to more specialized ones like the *McGraw-Hill Encyclopedia of Science and Technology* or *Van Nostrand's Scientific Encyclopedia*. As you do this exploratory work, read briskly without taking detailed notes; try for a general sense of the subject.

> **Step 6.** If you need a general introduction to your report subject, refer to nonspecialist encyclopedias listed above, or see the section on finding encyclopedias.

Arranging the parts of the outline. If you went through the brainstorming and narrowing steps, you have a list of topics that you can rearrange into a rough outline. It will be a "rough" outline because it may still need further rearrangement and addition of other topics or subtopics. The topic list below concerns cocombustion, which is the incineration of municipal solid waste (MSW) with conventional fuels to reduce conventional fuel consumption costs and related MSW disposal problems. Imagine that you had developed a topic list on this subject and then had narrowed the list to these topics:

```
Advantages of cocombustion          Steps in cocombusting MSW
Disadvantages of cocombustion     Historical background on cocombustion
Economics of cocombustion           Special components for cocombustion
Composition of MSW
```

The next step in outlining is to arrange the items in an

appropriate order. There are so many different patterns of arrangement that only most common ones can be reviewed here.

- One of the most common patterns in outlining is the chronological one. In a historical background section of an outline, the chronological approach is just about the only one you can use. Here is an outline excerpt concerning the historical background of nuclear research:

```
II. Historical background of nuclear research
    A. Becquerel's theory of radition in uranium (1896)
    B. The work of the Curies                              (far
    C. The work of Rutherford                              past)
       1. Demonstration of the internal structure of
          the atom (1911)
       2. Transmutation of atoms (1919)
    D. Development of technology to study atomic
       structure
       1. Cascade transformer (1928)
       2. Linear accelerator (1931)
       3. Cyclotron (1932)
       4. Betatron (1940)
    E. Hahn-Strassmann discovery of uranium fission
       (1938)
    F. Oppenheimer work on nuclear chain reactions       (near
      (1940s)                                           past)
    G. Explosion of the first atomic bomb (1945)
```

In some outlines, however, you almost don't notice the chronological pattern. For example, effects come after causes; solutions, after problems; or findings, after research method. The chronological pattern is most important in a research proposal outline:

```
  I. Introduction
     A. Historical background on caffeine studies    (past)
     B. Objectives of the study
     C. Limitations of the study
     D. Plan of development
 II. Review of the literature on caffeine
III. Experimental method to be used
 IV. Results of the tests
  V. Discussion of the results
 VI. Summary and conclusions
VII. Implications for further research            (future)
```

Chronologically, the researcher first defines the problem, the reviews the literature on the problem, plans a research method, conducts the research and gathers data, analyzes the data and draws conclusions from it. Afterward, she may consider areas for further research on the problem.

- Another common outlining pattern is to start with an object at rest, motionless as if in a photograph, and then to move to a discussion of it in operation, in action as if in a motion picture.

```
 II. Basic Components of Wind-Powered
     Electrical Systems
     A. Rotor                                  (motionless)
     B. Generator
     C. Tower
III. Basic Operation of Wind-Powered
     Electrical Systems
     A. Wind energy into mechanical energy
     B. Mechanical energy into electrical      (in motion)
        energy
     C. Stabilization of electrical energy
     D. Conversion to household current
```

- Some outlines move from a specific, close-up focus to a more general, panoramic focus. They seem to start with a microscope, examining the minute details of a subject, and end with a telescope, considering the subject from a distance in relation to other things. (This pattern can also be reversed.)

```
  I. Introduction
 II. Characteristics of municipal
     solid waste (MSW)
III. Methods of disposal of MSW               (microscope)
 IV. Processing municipal solid
     waste
  V. Plant modifications for
     cocombustion
 VI. Advantages of cocombusting MSW
     A. Environmental advantages
     B. Economic advantages                    (telescope)
VII. Case studies of three
     cocombustion plants
```

In this next outline, the focus broadens after part III, changing to aspects related to computerized voice recognition technology:

```
  I. Introduction
 II. Human voice production
     A. The generation of sound
     B. Factors affecting the human            (microscope)
        voice
III. Components of the isolated word recognition
     system
     A. The preprocessor
     B. The feature extractor
     C. Components in the
        classification phase
     D. Decision algorithms
 IV. Problems with computerized speech recognition
     A. Accuracy
     B. Limited vocabulary size
     C. Privacy
  V. Applications of voice recognition systems
     A. Data entry
     B. Mobility
     C. Security
     D. Telephone access
     E. Devices for the handicapped            (telescope)
 VI. Current availability of speech
     recognition systems
VII. The future of the computerized
     speech recognition industry
```

- Elements in outlines can also be arranged rhetorically, in other words, according to what is most effective for the reader. Here are some examples of rhetorical patterns:
    - Simple to complex
    - Least important to most important (or vice versa)
    - Least controversial to most controversial
    - Most convincing to least convincing (or vice versa)
    - Most interesting to least interesting

  This list is by no means complete: but you can see that elements in it are arranged according to impact on the reader--that is, the impact the writer would like to have. Here are some excerpts of outlines where these patterns are used:

  If you have ever studied computer programming, you

know that commands like PRINT are simple; variable assignment commands (like LET A = 30), less simple; and FOR-NEXT loop statements, rather complex. If you were outlining a report on fundamental BASIC commands for the beginner, you'd probably start with the simple ones and work your way to the complex:

Simple-to-complex order

```
III. USEFUL BASIC COMMANDS
     A. PRINT
     B. LET
     C. IF-THEN
     D. FOR-NEXT
     E. DIM
```

If you were writing a report on cocombustion of municipal solid waste (MSW) for a city concerned about skyrocketing coal costs, you could arrange your advantages section two ways: (a) save the "reduction of coal consumption" for last in order to build up to a climax, or (b) introduce it right away to grab the citizens' attention:

Climax order (least-most important)

```
A. Recovery of revenue from
   recyclable MSW
B. Reduction of landfill
   use, costs, and other re-
   lated problems
C. Reduction of coal use
   and related costs
```

Attention-getting order (most-least important)

```
A. Reduction of coal use and
   and related costs
B. Reduction of landfill
   use, costs, and other re-
   lated problems
C. Recovery of revenue from
   recyclable MSW
```

- An obvious outlining principle is to avoid creating interruptions within an outline sequence. Here's an example:

Outline excerpt with interruption

```
I. Municipal solid waste generated in the US
   A. Total amounts of MSW
      1. Increases since 1950
      2. Projected increases to the year 2000
   B. Processing MSW for cocombustion
```

```
         1. Primary storage
          2. Grinding
         3. Air sorting
         4. Magnetic separating
         5. Screening
         6. Secondary storage
      C. Characteristics of MSW
         1. Composition of MSW
            a. food waste
            b. paper and other rubbish
            c. noncombustibles
         2. Factors affecting enery content
            a. moisture content
            b. areas of MSW origination
   II. Power plant modifications for cocombustion
```

Revised outline excerpt

```
    I. Municipal solid waste generated in the US
       A. Total amounts of MSW
          1. Increases since 1950
          2. Projected increases to the year 2000
       B. Characteristics of MSW
          1. Composition of MSW
             a. food waste
             b. paper and other rubbish
             c. noncombustibles
          2. Factors affecting enery content
             a. moisture content
             b. areas of MSW origination
   II. Processing MSW for cocombustion
         A. Primary storage
         B. Grinding
         C. Air sorting
         D. Magnetic separating
         E. Screening
         F. Secondary storage
  III. Power plant modifications for cocombustion
```

In the problem version, the municipal solid waste discussion is interrupted by the MSW-processing discussion. A better arrangement would be to discuss MSW fully before going on to the discussion of how it is processed.

Use these common arrangement principles to get your topic list into an initial rough order. The rearranged version of the topic list shown previously might look this way:

```
1. Historical background
   -rising energy, utility costs
   -search for alternatives (review)
2. Composition of MSW
3. Special components of the cocombustion plant
4. Steps in the cocombustion of MSW
5. Economics
    -cost to build or convert
   -cost to operate
   -cost of produced electricity
6. Advantages
   -less coal used
   -reduction of utility rates
   -less landfill used
   -reduction of landfill costs and needs
7. Disadvantages
   -expense of converting existing facilities
   -handling MSW
   -increased emissions
```

Figure 6. Rough outline (built from the rough-draft topic list

Step 7. Arrange the topics you selected in Step 5 using the strategies discussed in the preceding section, and then identify the patterns (for example, chronological or simple-to-complex) you've used.

Elaborating the rough outline. When you "elaborate" a rough outline, you divide and subdivide the items already listed. Even without having done much research, you'll have a fair idea of what these second- and third-level items will be.

```
1. Historical background
        rising costs of conventional fuels
        problems with coventional MSW disposal
        alternatives
2. Composition of MSW
        properties
        sources
        energy content
        ...
3. Special components of the cocombustion plant
        component 1
        component 2
```

```
        component 3
        ...
4. Steps in the process of cocombustion with coal
        step 1
        step 2
        step 3
        ...
```

Notice how the basic kinds of writing and organizational patterns (covered in Part 1) are used in elaborating the rough outline. With an elaborated outline, you can begin to read and take notes: each item represents a question mark that you need to get information on. As you get this information, you can make the wording of outline items more specific: for example, "Component 1" would change to "Collection receptacles." Here's an excerpt of the same outline above, but much further along:

```
3. Special components of the cocombustion plant
   a. collection receptacles
   b. power compaction unit
   c. storage pits
   d. incinerator feed system
      1. gravity chute
      2. ram feeder
      3. hopper
      4. furnace
      5. charging gate
```

Elaborating the rough outline is essentially a process of dividing that outline using two basic principles:

- *Division into similar elements.* Many elements in a rough outline can be divided into groups of similar elements:

```
Elements of discussion                  Subdivisions

An object or mechanism.............. Parts, components, or
                                     characteristics
A process or event.................. Steps, phases, or stages
A classification.................... Types, kinds, or sorts
A comparison........................ Points of similarity or
                                     difference
Causal discussions.................. Causes, effects, benefits,
                                     problems, or solutions
```

Thus, a discussion of the main element "incinerator feed system" in a rough outline could be elaborated this way--into parts:

Rough outline	*Elaborated outline*
3. Special components of cocombustion plant	3. Special components of a cocombustion plant a. collection receptacles b. power compaction unit c. storage pits d. incinerator feed system

- *Division into elements related topically.* Elements in an outline can subdivide by topics that are all related but that are not similar to each other as above:

Rough outline	*Elaborated outline*
(D. Incinerator feed system) 4. Furnace 5. Charging gate	(D. Incinerator feed system) 4. Furnace a. purpose b. main types c. main components d. materials e. dimensions f. design problems 5. Charging gate

As a result of elaborating procedures like these, an excerpt of a more detailed outline of the cocombustion report might look like this:

```
  I. Municipal solid waste generated in the US
     A. Total amounts of MSW
        1. Increases since 1950
        2. Projected increases to the year 2000
     B. Characteristics of MSW
        1. Composition of MSW
           a. food waste
           b. paper and other rubbish
           c. noncombustibles
        2. Factors affecting enery content
           a. moisture content
           b. areas of MSW origination
 II. Processing MSW for cocombustion
     A. Primary storage
```

```
     B. Grinding
     C. Air sorting
     D. Magnetic separating
     E. Screening
     F. Secondary storage
III. Power plant modifications for cocombustion
     A. Storage areas
     B. Conveyor lines
     C. Boiler modifications
     D. Air control equipment
 IV. Advantages of cocombusion
     A. Environmental advantages
          1. Reduction of landfill needs
          2. Reduction of coal use
          3. Recovery of recyclable materials
     B. Economic advantages
          1. Reduction of MSW disposal costs
          2. Revenue from recyclables
          3. Reduction of utility bills
 V. Disadvantages of cocombustion
     A. Potential for increased air pollution
     B. Problems with processing MSW
```

Figure 7. Example of a more detailed outline

With an outline this well developed, the next step is to begin doing some serious reading, researching, investigating, and note-taking. During this next phase, however, the outline will continue to change as new and different information turns up.

Step 8. Use the strategies described above to elaborate the rough outline you developed in Step 7.

Finishing the outline

You need not be concerned about the finishing touches for your outline until after you've written and revised the rough draft. Writing the rough draft is the true test of an outline: during that stage you are likely to discover parts of the outline that don't work, are out of place, or do not belong at all. When you "finetune" an outline after writing the rough draft, however, you are actually transforming it into a table of contents that you can use in the finished, bound copy of

the report. Here are some specific things to look for in your final work on an outline:

Comparing the outline to the rough draft. Even the most carefully prepared outlines rarely match the resulting rough drafts. Even the most straightforward of technical subjects can take off in their own unexpected directions. Therefore, you must compare your completed rough draft to the original outline in the following ways:

1. A good way to start is to insert the outline phrases into your rough draft; in other words, insert the headings into your report, if you have not already done so.
2. Make sure that the sequence of items in the outline matches the sequence of topics in the rough draft of the report.
3. Check to see if any items in the outline did not get discussed at all.
4. Check to see if any new topics cropped up in your rough draft but do not appear in your outline.
5. Look for longer-than-usual sections in your rough draft for which there are few outline items. Try to find additional outline items within those pages. Here is an example of a longer section; notice that in the original version, there is only one outline item (or heading) whereas there are seven in the revised version:

Passage without headings

II. SOLID WASTE GENERATED

This country is a great producer of solid waste. In the U.S. in 1980, each person will produce about 8 pounds of solid waste a day, whereas in Europe the average production rate is 3 to 4 pounds per person per day. An added difference is that in Europe there 243 facilities to utilize solid waste (although none are for the production of electricity), whereas in the U.S. there are only about 20.

As can be seen in Table 1, this country has increased the generation of waste from 1970 to 1980 by 50 percent, and will increase another 50 percent from 1980 to 2000. These quantities represent only that portion which is collected; there is another 5 to 10 percent that is not collected. These percentages add up to an undeniably large quantity of potential energy that goes almost totally unused in the U.S.

Table 1. Quantities of Municipal Waste Generated in the U.S.

Year	Lbs/person/day	Tons/year x 106
1950	3.5	102
1965	4.5	156
1970	5.3	199
1980	8.0	314
2000	12.0	526

Disposal of solid waste is by far the most useless method of eliminating the refuse. Most methods of disposal currently employed do not utilize the waste material. Disposal costs in this country amount to over $1.02 billion per year.

Sanitary landfills involve the placement of solid waste in valleys, ravines, or other natural depression in the earth. The waste is placed in the landfill in 18- to 24-inch layers and then covered with soil. This process is repeated until the hole is full and a new location is needed. The average life of a landfill is 5 to 10 years. The cost of a landfill varies from $1.35 to $2.70 per ton of refuse. This rate involves disposal cost only; collection costs are omitted.

Land spreading is a method of waste disposal in which waste is placed in a field and then is plowed into the soil. This method is used only when small quantities of waste are generated because large land areas are required for such operations. The process is a clean one, but the life of such facilities is only 2 to 5 years. Disposal costs range from $0.60 to $4.05 per ton of waste, depending on the quality of the land.

Open dumping, one of the most undesirable of all methods of disposal of solid waste, involves placing the waste in open pits or on level areas. The refuse is in constant exposure and is a haven for vermin. Open dumping costs from $0.65 to $1.00 per ton of refuse and is illegal in most areas.

Incineration in which no energy is recovered is the most commonly used method of solid waste disposal in the U.S. The primary purpose of incineration is to reduce the volume of the waste before it is carried to a landfill. The cost of incineration ranges from $6.75 to $20.00 per ton of waste and represents an enormous waste of both money and energy.

Revised outline

II. SOLID WASTE GENERATED
    A. Quantities of Solid Waste
    B. Methods of Solid Waste Disposal
        1. Sanitary landfills

2. Land spreading
3. Open dumping
4. Incineration

Passage revised with headings
(to indicate new outline items)

II. SOLID WASTE GENERATED

This country is a great producer of solid waste. In the U.S. in 1980, each person will produce about 8 pounds . . . .

Quantities of MSW Generated

As can be seen in Table 1, this country has increased the generation of waste from 1970 to 1980 by 50 percent . . . .

Methods of Solid Waste Disposal

Disposal of solid waste is by far the most useless method of eliminating the refuse. Most methods of disposal currently employed do not utilize the waste material. Disposal costs in this country amount to over $1.02 billion per year.

Sanitary Landfills. Sanitary landfills involve the placement of solid waste in valleys, ravines, or other natural depression in the earth. The waste is placed . . . .

Land Spreading. Land spreading is a method of waste disposal in which waste is placed in a field and then is plowed into the soil. This method is used only when . . . .

Open Dumping. Open dumping, one of the most undesirable of all methods of disposal of solid waste . . .

Incineration. Incineration in which no energy is recovered is the most commonly used method of solid waste disposal in the U.S. The primary purpose of incineration is to . . . .

Figure 8. An example of using rough drafts to elaborate outlines

Step 9. When you have written a rough draft of your report, compare it to your outline, and update your outline using the suggestions discussed above.

Eliminating one-item outline entries. Here is an excerpt of an outline with a one-item entries:

Outline with single item entry

```
 II. Characteristics of municipal solid waste
     A. Composition
        1. Food waste
        2. Paper
        3. Other rubbish
III. Current methods of disposal
```

Revised outline

```
 II. Characteristics and Composition of MSW
     A. Food waste
     B. Paper
     C. Other rubbish
III. Current Methods of Disposal
```

In this example, there is no "B" to go along with the "A". To fix this problem, either (a) insert additional items, or (b) delete the single item by combining some of its phrasing into the preceding item.

To insert additional items into the outline, you try to add at least a "B" for any unaccompanied "A"; at least a "2" for any unaccompanied "1"; at least a "b" for any unaccompanied "a". Of course, any Cs, Ds, 3s, 4s, cs, ds, and so on are also welcome. Here is an example of a single-item entry and its corresponding report section:

One-item outline entry problem
and corresponding report excerpt

```
IV. Solid Waste Characteristics
    A. Energy Content
 V. Processing Solid Waste
```

IV. SOLID WASTE CHARACTERISTICS

The amount and characteristics of solid waste vary considerably over a year and in different locations. In the fall, for example, leaves change the nature of solid waste in a significant way. The figures discussed below are averages that account for both the variations in time and in location.

Composition

Municipal refuse is composed of a vast array of products that

have lost their usefulness. These wastes include home wastes, commercial wastes, and city wastes. While home and commercial wastes are usually placed in receptacles for periodic removal by collection agencies to landfills or incinerators, city wastes usually collect elsewhere and require special handling and disposal.

Home wastes include such diverse products as glass bottles, cans, plastic toys, cellophane, paper, cardboard, nails, small appliances, tools, light bulbs, clothes, rubber products, and wood and food items. If these wastes are not separated into classes, such as metal, glass, and paper, they are described as "heterogeneous" wastes.

Commercial wastes are generated by retail businesses and institutions such as hospitals, banks, and schools. Although these wastes are also considered heterogeneous, they contain high percentages of office waste and packing materials . . .

Energy content is often referred to in British Thermal Units (BTUs) per pound of waste. A BTU is the amount of energy required to raise one gram of water one degree centigrade. With moisture present in the material the energy content decreases in the heating value by approximately 30 to 40 percent. The range in energy content of typical municipal solid waste is from 3 thousand to 60 thousand BTUs per pound, with an average value of 4500 BTUs per pound. This last figure assumes a moisture content of from 15 to 40 percent and an average of 20 percent.

In comparison, coal has an average heating value of 1100 BTUs per pound and a moisture content of 20 percent on the average.

V. PROCESSING SOLID WASTE

Processing MSW involves certain modifications to existing incinerator designs....

Revised outline and corresponding passage
(with headings revised to show the new outline item)

IV. Solid Waste Characteristics
    A. Composition
    B. Energy Content
 V. Processing Solid Waste

IV. SOLID WASTE CHARACTERISTICS

The amount and characteristics of solid waste vary considerably over a year and in different locations. In the fall . . .

Composition

Municipal refuse is composed of a vast array of products that have lost their usefulness. These wastes include ...

Energy Content

Energy content is often referred to in British Thermal Units (BTUs) per pound of waste. A BTU is the amount of energy ...

V. PROCESSING SOLID WASTE

Processing MSW involves certain modifications to existing incinerator designs....

Figure 9. Solving the one-item outline entry problem

One way to revise the problem in Figure 9 would have been to delete "A. Energy Content" altogether and rephrase the preceding item as "IV. Solid Waste: Characteristics and Energy Content." But another and usually better way to handle the problem is to scan the corresponding passage for at least one other item, in this case, "Energy Content."

Adjusting items in an outline. You should also make sure that items in your outline are on the right level. Here is an example of this problem and a revision:

Unadjusted outline	*Revised outline*
A. Plant Modifications for Coc-combustion	A. Plant modifications for Co-combustion
1. Storage areas	1. Storage areas
2. Conveyor lines	2. Conveyor lines
3. Boiler modifications	3. Boiler modifications
4. Air control equipment	4. Air control equipment
B. Economic Benefits	B. Benefits of Cocombustion
C. Environmental Benefits	1. Economic benefits
	2. Environmental benefits

In this revision, the problem was solved by adding a more general item ("Benefits of Cocombustion") and downshifting the original "B" and "C" items. Now, here's another example:

Unadjusted outline	*Revised outline*
B. Environmental Benefits	B. Environmental benefits

```
C. Reduction of Landfill Needs          1. Reduction of landfill
D. Economic Benefit                        needs
                                        2. Reduction of Coal
                                           Consumption
                                    C. Economic benefits
```

Here, "Reduction of Landfill Needs" is really a subdivision of "Environmental Benefits". Downshifting it to a "1" creates a single-item entry, however. Therefore, we might add a second item like "Reduction of Coal Consumption."

Checking for parallel phrasing. The phrasing of any related group of outline items must be "parallel." To be "related," the items must be on the same level and make up a separate group of items. Parallelism is explained in detail elsewhere, but essentially it means sticking with similar kinds of phrasing in related outline items. In the example of a non-parallel outline below:

- Items I and II are related and must be parallel to each other.
- Under I, items A and B are related and must parallel to each other.
- Under IB, items 1, 2, and 3 are related.

```
 Non-parallel outline excerpt          Parallel version

 I. Municipal Solid Waste Gener-      I. Municipal Solid Waste
    ated in the U.S.                     Generated in the U.S.
    A. What is the total output?         A. Total Output of MSW
    B. Disposal methods                  B. Disposal methods
       1. Sanitary landfills                1. Sanitary landfills
       2. Spreading MSW in open             2. Open spreading
           fields and plowing it under      3. Open dumping
       3. Open dumping               II. Characteristics of MSW
II. What Are the Characteristics of
    MSW?
```

Figure 10. Revising for parallelism in outlines

Making outlines self-explanatory. The wording of outline items should clearly indicate the content of the corresponding sections. Items like the following simply don't say enough about the contents of the sections that they represent:

```
Background              Discussion
Applications            Technical Discussion
Description             Function
The Future              Operation
Economics               Review
```

Here is an outline excerpt revised with much more self-explanatory phrasing:

Weak outline phrasing	*Revised outline phrasing*
I. Background	I. Background: Rising Utility Costs
II. Composition	II. Composition of MSW
III. Processes	III. Processes in Cocombusting MSW with Coal
IV. Components	IV. Basic Components of Cocombustion Plant Facilities
V. Economics	V. Economics of Cocombustion: Construction, Conversion, Operation, Return

Adjusting the graphics. The final step in outlining is to make the numbering, lettering, spacing, and capitalizing—the graphics of the outline—consistent.

- Use a consistent style of capitalization.
- Use consistent indentation.
- Skip lines between outline items in a consistent manner.

Step 10. Use the strategies above to (a) locate and eliminate one-item outline entries, (b) make sure that the items in your outline are on the right level, (c) make the items in your outline parallel, (d) locate and rephrase items that are not fully self-explanatory, and (e) make the graphics of your outline consistent.

Exercises

1. Revise the outline here using the finishing-up suggestions discussed in this section.

A report on weather forecasting

I. Historical
   A. Weather Lore
      1. what phase the moon is in
      2. reactions of people to weather
      3. reactions of animals to weather
      4. optical phenomena
      5. Rainbows
      6. Certain sequences of weather conditions
   B. Technological advances have changes weather forecasting practices.
      1. predicting storms was the early concern.
      2. use of radio to collect information
      3.Radiosondes for upper atmosphere information
      4.computers

II. BASIC PRACTICES
   A. Observations and Reports
      1. reports of land stations once or twice a day to a central bureau
   B. Analyzing weather charts
      1. Examination of well-defined pressure systems
         i. low pressure areas
         ii. high pressure areas
         iii. troughs of low pressure
         iv. ridges of high pressure
         v. cols, or saddle-backed regions

III. Techniques Used in Short-Range Forecasting
   A. Computation of Displacements
   B. Forecasting Based on Physical Theory
   C. Analogues and types
   D. Regression equations and diagrams
   E. Time-series analyses
   F. Success rate of time-series analyses

IV. Extended-Range Forecasts
   A. The Namias chart
      1. use of several days' averages
      2. comparsons to long-term normals
      3. limited usually to 30 days

V. SPECIAL WEATHER FORECASTS

2. Find an encyclopedia article of at least 3 pages or more on a subject you know something about or have an interest in, and create an outline of that article. Include as many levels of detail in your outline as possible.

3. Outline one of the following descriptions of a report project. Beware, however: the ideas are scattered,

mixed up and fragmentary.

A Report on the Greenhouse Effect

This report is concerned with the greenhouse effect, the way in which atmospheric carbon dioxide is increasing and leading to a group of potentially catastrophic consequences for this planet. It discusses the climatic effects of increased carbon dioxide which include changes in local weather patterns, drought, increased tropical storm activity, and sea level increases. The report uses the 1930s as an analogue, or model of comparison; the 30s was a period of unusually higher temperature. The report also discusses what can be done if anything about the greenhouse effect, such as reducing fossil fuel use, reduction of the burning of wood and other substances, use of cleaner fossil fuels, development of solar and nuclear power resources, massive reforestation on a global scale, and further research into the carbon cycle. The report discusses the basic steps in the natural greenhouse effect, in which a certain amount of carbon dioxide is trapped in the atmosphere, causing higher global temperatures than there would be without the effect. The report discusses the major contributors to increased concentrations of carbon dioxide: deforestation, burning of fossil fuels, burning of wood, etc., and it also discusses how there is a positive feedback mechanism in which increased carbon dioxide in the atmosphere increases the trapping of more carbon dioxide.

A Report on the Saccharine Controversy

In this report, the controversy over saccharine as a cancer-causing substance is discussed. Important in the report is the discussion of a number of carcinogenicity studies, in particular, the Canadian rat studies which nearly led to the ban on saccharine in the 1970s, the Ames test for mutagens and a group of studies generally referred to as promotion studies. One section of the report discusses health risks associated with saccharine such as bladder cancer; risks of other cancers such as uterus, ovary, breast and lung cancers are also reviewed. The health benefits of saccharine are also discussed; these include reducing sugar intake which is helpful or necessary to the overweight or diabetic. The clinical aspects of the studies and the risks and benefits that they found are also discussed--how the studies were run, their findings, the implications of those findings, and their reliability. The report discusses the original synthesis of saccharine in 1879, the chemical structure of the substance, its metabolic effects. The report also discusses what the legislation has been on saccharine--the Food, Drug and Cos-metics Act of 1938 and the Food Additives Amendment of 1958 (this amendment contained the Delaney Clause which states that

no substance found to be carcinogenic to man or animal can be added to food). The report goes into the history of the proposed ban on saccharine in 1977 upon publication of the Canadian rat studies and then the postponement of that ban a few weeks later after public outcry, lobbying--lobbying in particular by the Calorie Control Council, a group of Japanese and American manufacturers of saccharine.

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