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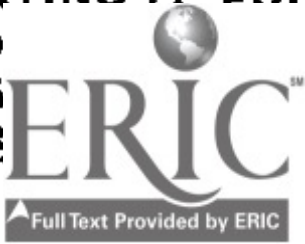
ABSTRACT

The Solid Waste Manager's Manual is one of a set of twenty-one manuals used in METRO-APEX 1974, a computerized college and professional level, computer-supported, role-play, simulation exercise of a community with "normal" problems. Stress is placed on environmental quality considerations. APEX 1974 is an expansion of APEX--Air Pollution Exercise (ED 064 530-550; ED 075 261; ED 081 619), and includes roles for an environmental quality agency, water quality manager, solid waste manager, and various pressure groups, in addition to the previously developed roles of city and county politicians, city and county planners, air pollution control office, developers, industrialists and newspaper. Two industries have been added, as have a number of program options. The participants may range in number from 17 to 100. Each run of the game should consist of at least three cycles (simulated years), the optimum being five cycles. Each cycle should span at least a three-hour period. A cycle is composed of two major phases: the first is the game simulation; in the second phase, decisions emerging out of the game simulation are analyzed by a computerized system of integrated simulation models. The METRO-APEX computer program is in Fortran IV and runs on an IBM 360-50 or higher series computer. (BT)



METRO-APEX

1974

A Computerized Gaming Simulation Exercise
For Training in Environmental Management
and Urban Systems

Developed by the
COMEX Project
University of Southern California

through a grant form the
Control Programs Development Division
Environmental Protection Agency

A revised version of the APEX Air Pollution Exercise
developed jointly by the
COMEX Project, University of Southern California
and
Environmental Simulation Laboratory, University of Michigan
June 1974

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TABLE OF CONTENTS

PREFACE

PREFACE

METRO-APEX is the result of a long term research and development effort by a number of dedicated individuals. The inspiration, and much of the technical basis evolved from a similar exercise (M.E.T.R.O.) originally developed by the Environmental Simulation Laboratory, University of Michigan. In 1966, a grant from the Division of Air Pollution Control, U.S. Public Health Service was awarded to the COMEX Research Project, University of Southern California, to develop a dynamic teaching instrument, METRO-APEX. Working in close cooperation, the COMEX Research Project and the Environmental Simulation Laboratory successfully developed the initial version of the METRO-APEX exercise in 1971. This computer-based gaming simulation was designed to provide a laboratory urban community in which air pollution management trainees could apply and test the knowledge and skills gained through conventional educational methods.

METRO-APEX has proven to be highly adaptable to training programs dealing with the many aspects of air pollution control including law, management, air quality monitoring, land use planning, budget preparation, citizen participation programs, state and federal grant procedures, and political decision-making processes. As a result, METRO-APEX is in great demand as a valuable supplement to university training programs, and in many cases is being used as a central curriculum focus. Over 60 universities have been trained in the use of METRO-APEX. It has also been translated into French and Spanish and is being used in seven countries outside of the United States.

Based on the success of the initial METRO-APEX program, COMEX was awarded a grant from the Control Programs Development Division of the Environmental Protection Agency to substantially revise and broaden the simulation exercise to encompass the wide spectrum of environmental management issues. This current version, of which this manual is a part, was completed in June 1974 and greatly increases the utility and teaching potential of the exercise. In this version, the interrelationships among air, water and solid waste are demonstrated, the strategies and options available to players have been broadened, new roles have been added, the exercise materials have been updated to reflect the latest technology and nomenclature, and many of the operational problems associated with the earlier version have been rectified.

METRO-APEX is one of, if not the most complex gaming-simulations of an urban area in use today. Although it was designed to supplement standard teaching methods, APEX is far more than an educational tool. It is a communication channel of a new level--capable of providing both the language and the forum for information transfer between persons and groups with different educational and cultural backgrounds as well as different perspectives of the urban situation.

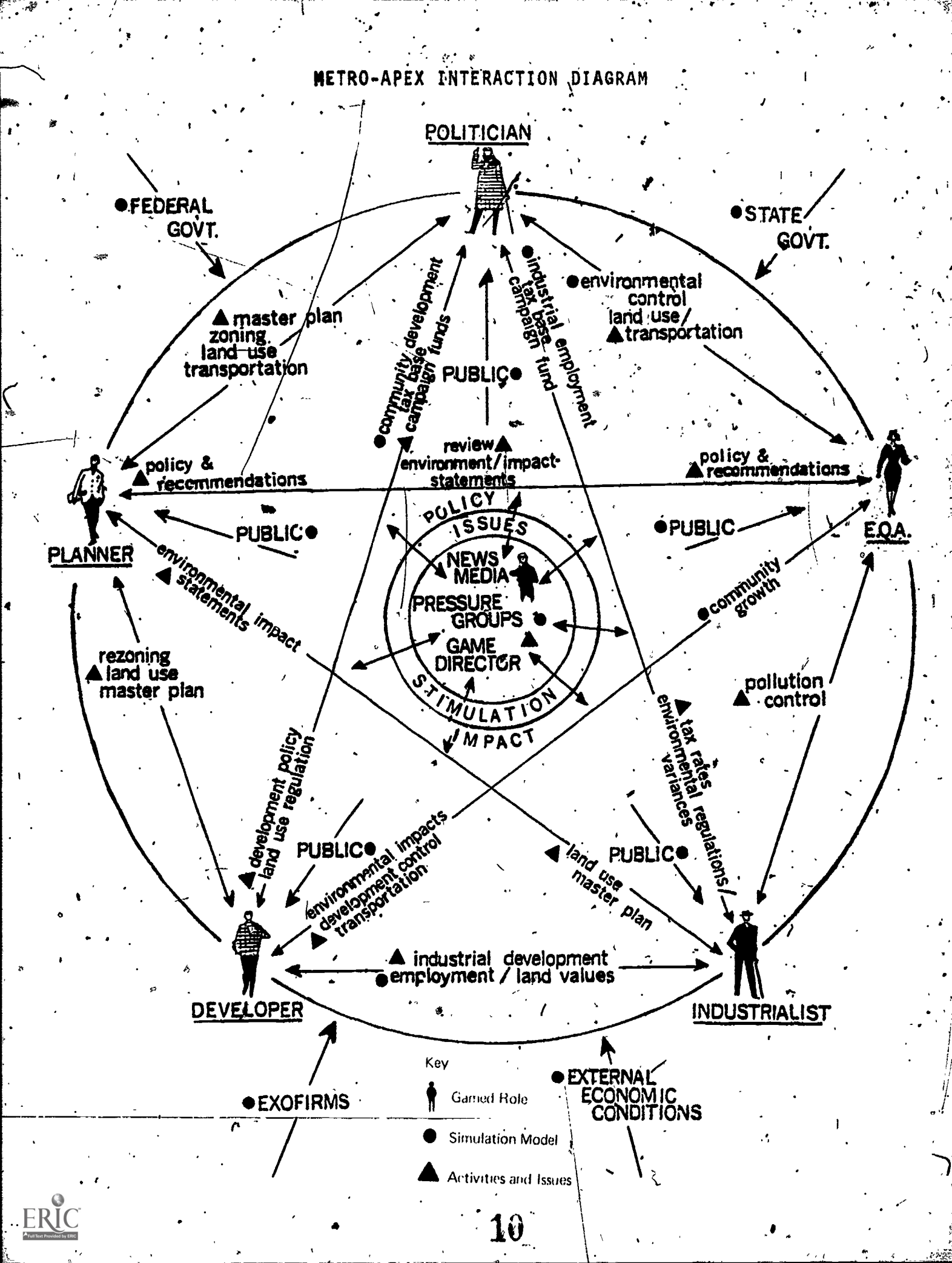
METRO-APEX is composed of two essential components: (1) a computerized system made up of a series of well-integrated simulation models linked to a (2) "gamed" environment encompassing a series of interactive roles. The computerized system predicts the changes that occur in several sectors of the urban system in response to the decisions made by participants in the "gamed" environment, decisions made by persons outside the "gamed" environment (other actors whose behavior is simulated in the computer), and external pressures on the metropolitan area (also simulated in the computer).

The County of APEX is run year by year by principal decision makers performing both the mundane and extraordinary functions of their office in the "gamed" environment. Each cycle or year is condensed in time to a three to eight hour session during which the decision makers formulate their yearly policy. The decisions that emerge out of the "competitive--cooperative" environment of the gaming-simulation are used as priming inputs to the computer simulation. The change in the status of the urban area is calculated by the computer and returned to the decision makers as the primary input to the next cycle of action. Included in the change picture generated by the computer are selected social, economic and physical indicators which show the magnitudes of change in key areas and a newspaper which serves as the focal point of local public opinion.

The key decision makers acting in the gamed environment include an Environmental Quality Agency with departments of Air Pollution, Water Pollution and Solid Wastes; Politicians, Planners and Administrative Officers from a Central City and a County; Land Developers and Industrialists from the private sector; and representatives from the News Media and Pressure Groups. The Politicians are responsible for the administration of their respective jurisdictions and for the formulation and implementation of various programs to upgrade the social status of their constituents. The Planners serve as aides to the Politicians and represent the major long range coordinating force in the community. The Environmental Control Officers are charged with the task of monitoring and alleviating the pollution problems. The private business sectors operate to foster their own interests and frequently those of the community. Pressure Groups and News Media advocate various positions on community issues. Generally, each decision maker finds it to his advantage to coordinate and/or compete with other players in his efforts to promote his strategies. The METRO-APEX General Interaction Diagram included here indicates possible linkages among the roles.

In general, people have great difficulty understanding the dynamics of a complex system through traditional means. Gaming-simulation offers participants the opportunity to study, work with, and discuss the structure of such a system and to experiment with intervention strategies designed to change that structure. When used as a teaching device, the strength of a gaming-simulation such as METRO-APEX lies in the opportunity afforded participants for involvement in the system. When compared with the passive observation of the system offered by traditional methods, this approach has had great success.

METRO-APEX INTERACTION DIAGRAM



CHAPTER 1

A Brief Description of APEX County

Chapter 1

A BRIEF DESCRIPTION OF APEX COUNTY

History

The first settlers of APEX County were farm families emigrating from New England and New York State beginning about 1830. During the middle of the nineteenth century, German immigrants continued the settlement patterns of established dispersed family farms. Income to pay for the necessary imports of products from the East was derived primarily from the production of farm crops and, more importantly, timber. Small market towns, often containing milling facilities, developed between 1820 and 1860. At the same time, the County was organized as a unit of government by the State, and the basic network of roads was completed.

The major impetus for the later development of the Central City as a regional center was its selection as the state capitol in 1847. The nation's first land-grant university was established east of the Central City in 1855, further enhancing its growth. Central City was incorporated in 1859 and the Suburb, in which the university was located, was incorporated in 1910. The University's control of a large block of land was to exercise profound influence on the future physical pattern of development. Much of the logical development corridor outward from the City was preempted by this facility.

Steam railroads were first built into APEX County beginning in the 1860's. Those small market-milling communities with stops and depots on the rail lines began to assume a greater importance than the small communities away from the lines. The impact of the railroads on the small communities can be seen from the following description of Central City:

> By the year 1863, the City...was a bustling, urban center. Early accounts tell us that, at that time, the City included eleven churches, five hotels, two flouring mills, three tanneries, two breweries, three saw mills, two sash and blind factories, three iron foundries, two printing offices, several brick yards, and a large number of mechanic shops.*

Although growing, it should be noted that manufacturing was still minimal. Exports were dominated by agricultural and timber products, and most other production was for local consumption only.

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*Tri-County Regional Commission, "History of the Tri-County Region," Information Report 7, updated, pp. 24-25.

Beginning in perhaps 1880, factories producing goods to be exported out of the region were built in the area, fostered by the completion of railroad ties with the rest of the country. These factories, mainly built near railroad depots, stimulated the migration of factory-worker families into the region. Most of these families settled near the factories where they were employed, adding further to the growth of the towns near the railroad. Just before the turn of the century the introduction of the automobile industry into Central City gave the final impetus needed to make Central City into the dominant community in the County. Beginning about the same time, electric interurban railways were extended from Central City to the north, east and west, allowing many workers from the new industries in the City to move further away from their place of employment.

By the 1920's, automobiles had become readily available and their use was encouraged by the paving of most of the roads in the County. Those who had formerly lived fairly close to the interurban system began to be dispersed throughout larger areas and to settle in lower density neighborhoods. Until about 1930, most new development was found in the filling-in of the Central City and Suburb. Although the growth of industrial and bureaucratic functions proceeded in the Central City and the area adjacent to it, the more outlying townships remained, and to some extent still remain, predominantly agricultural. The growing urbanization which has occurred more recently in these fringe areas has been primarily stimulated by the construction of the interstate expressway system beginning in the 1950's.

The interstate highway freeway system in APEX County is shown on the map at the end of this chapter. One major expressway comes from the southeast, sweeps around the southern and western fringes of the City and leaves the County from its northwestern corner. A second expressway comes up from the south, intersects the first and continues northward into the Suburb. It is anticipated that in the future this expressway will be continued northwards, then swing west to finish an expressway loop around the City (dashed line).

In addition to the airport, major transportation into and out of APEX County is provided by rail (primarily freight) and expressway. The attached map outlines the routes of the three rail lines, which generally follow the river valleys and intersect in Analysis Area 8.

A local APEX bus line serves the Central City, with some service extended into the Suburb and nearby areas of the County.

Most travel in APEX is currently by private automobile. There are approximately 2.1 people per registered automobile in APEX. This amounts to approximately one billion automobile miles per year. The automobile is the cause of substantial congestion, property damage, death and air pollution in APEX. Further information about the contribution of the automobile to pollution can be obtained from the Air Pollution Control Officer.

The automobile represents an immense financial burden to owners, political jurisdictions, employers and commercial establishments. Taxes to expand and maintain the road network are constantly expanding. Vast areas of land are required for parking. At the same time, bus ridership is decreasing.

Political Jurisdictions

In the METRO-APEX game, the County is composed of four autonomous jurisdictions: The Central City, Suburb, Township 1 and Township 2. The County has been further divided into 29 "Analysis Areas", each resembling a census tract. The Central City comprises Analysis Areas 1 through 13; the Suburb, AA's 17 through 19; Township 1, to the west, contains AA's 23 through 28 and Township 2, to the east, contains AA's 14-16, 20-22 and 29. (See map). In addition to analysis areas, the Central City is politically divided into Wards:

Ward 1 -- AA's 1-4
Ward 2 -- AA's 5-8
Ward 3 -- AA's 9-13

Each Ward is the electoral district for one of the three City Council seats represented in the game. The County government (Board of Supervisors) is comprised of members elected from the Suburb, from the Townships, from the County-at-large and the Central City-at-large.

The City Council and County Board of Supervisors are the only two local governmental units actively represented in the game. Other local governments, including the school boards, are simulated. In some cases, City and County governments have parallel functions; e.g. they both provide police services, planning and capital improvements. The County however, has area-wide responsibility for three major services not provided by the City government: public health, welfare and pollution control. In these three areas, County actions, directly affect Central City residents as well as residents in the outlying areas. Both the municipal and County governments derive their primary financial support from the same tax base--real property. County property taxes are paid by land-owners, in addition to property taxes collected by the municipal government and the school board in each political jurisdiction.

Data provided to players in the game are nearly always given by analysis area--this is also the smallest unit of scale in referring to locations; that is, a project or house or industry is located in "Analysis Area X" rather than on a particular street or a particular intersection. Characteristics of each individual analysis area, including the socio-economic composition of the residents and the proportions of land area devoted to particular land uses, may be found in the Planners data.

A few analysis areas are almost completely chacterized by one or two major features which are often referred to throughout play. These major features are given in the following list, with their analysis areas indicated:

Central Business District (CBD) -- nearly all of Analysis Area 8

State Capitol -- Analysis Area 8

Ghetto -- Analysis Area 4 and Analysis Area 8

University -- Analysis Area 19 (all)

"Best" residential areas -- Analysis Areas 9 (all) and 17 (most)

These features are not only unique in the County, but they also dominate the analysis areas in which they are located; in the game they are likely to be referred to as locations in themselves, with no further locational explanation given.

A list of other important man-made features of the County, and their locations, is given later in this chapter.

Geography and Climate

APEX County is located nearly at the center of an industrialized northern State, some 85 miles northwest of one of the largest metropolitan areas in the United States. The once heavily forested land, extending roughly 320 square miles, is quite flat and for the most part adequately drained for agriculture.

The Great River, a major watercourse in the State, enters the County from the south in Analysis Area 23, meanders north and west, then back to the east and north as it passes through Analysis Area 8. There it is joined by the Red Oak River, which comes in from the east. The enlarged Great River exits from the County in Analysis Area 26, from which it continues west for some 85 miles before emptying in to the Great Lakes. Major drainage of the County is through the Great River system.

Just before it empties into the Great River, the Red Oak River is joined by Sycamore Creek, which wanders up from the southeast. Much of the area in Analysis Areas 11 and 13, near this creek, is low and somewhat marshy, not ideal for heavy development. The other major marshy area in the County is in Analysis Area 14, to the northeast in Township 2. There are also several small lakes in this analysis area and quite a large State Park. The largest lake

in the County is located in Analysis Area 16. This was a primary recreation area in the early part of this century but is less ideal now, due to heavy pollution loads and deteriorating shoreline development. There are small creeks which wander through many analysis areas in the County. The only other river of any significant size, however, is Looking Glass River, which runs east and west through the northern portion of the County, primarily in Analysis Areas 28 and 29.

The climate of APEX County is temperate, with summer temperatures averaging about 70 degrees and winter temperatures which average about 25 degrees. There is an annual rainfall of roughly 41 inches, with heavy snows to be expected primarily in the months of January and February. Prevailing winds are westerly, swinging to the southwest in summer and northwest in winter.

Major Public Facilities

As might be expected, the Central City and Suburb are significantly better endowed with public capital improvements than are the Townships. The following list includes the most important public structures in the County, and indicates under whose jurisdiction they are operated and where they are located:

Airport (County) -- AA 29, just outside the City limits. The Airport has three runways and a terminal of 27,000 square feet. Two commercial airlines serve the County through this airport; cargo and general aviation are also served.

Boys Training School (State) -- AA 7.

City Hall -- AA 6. This is an old structure, built 80 years ago and considered a scandal. A more central location has been chosen for the new City Hall under construction in AA 8.

Community Centers (City) -- AA's 2, 4, 7, 8, 10, 13. These are mostly old houses purchased by the City to house neighborhood meetings and the operation of special programs.

Community Centers (Township Halls) -- AA's 14 (2), 24, 27, 29.

Community College (County) -- AA 8. The facility is currently housed in an old library and elementary school.

County Building -- AA 8, This includes all County offices and the meeting rooms for the County Board of Supervisors.

County Court House -- AA 8, adjacent to County offices.

Fire Stations (City) -- AA's 2, 3, 4, 5, 6, 8 (2), 11, 12.

Fire Stations (Townships) -- AA's 20, 23, 25. These are modest stations housing limited equipment. Volunteers provide firefighting manpower.

Hospital (County) -- AA 7. This was built in 1912 and was expanded in 1922, 1942, and 1960. It contains 362 beds, including a 35-bed tuberculosis wing, and caters primarily to the indigent. There are three private hospitals in the County with an additional 650 beds.

Library (City) -- AA 8. This is an old downtown building. There are branch libraries in AA's 1, 5, 11, 12 (2), 13.

Library (Suburb) -- AA 18.

Sewage Treatment Plant (City) -- AA 2. This plant provides both primary and secondary treatment and has a capacity of 34 million gallons per day. It currently averages 22 million gallons daily.

Sewage Treatment Plant (Suburb) -- AA 19. This plant provides primary sewage treatment, with a capacity of 12 million gallons per day; it currently handels an average of 6.75 million gallons daily.

Sheriff Station (County) -- AA 8. This is attached to the County Building.

Water Treatment Plant (City) -- AA 8. Water for the City is derived from the Great River as it exits from Analysis Area 8. Capacity is 42 million gallons per day, with the average daily flow currently being 22 million gallons. Treatment includes filtration, purification, flouridation and lime softening.

Water Treatment Plant (Suburb) -- AA 19. The Suburb's water is drawn from the Red Oak River as it enters AA 19. Capacity is 6 million gallons daily,

with current average flow being 2.5 million gallons per day. Treatment includes chlorination, fluoridation and ziolite softening.

Zoo (City) -- AA 7.

Industry and the Economy

Major employment in APEX County is provided by the State Capitol Complex, the University and a automobile assembly plant, located in Analysis Area 4. While State Government is a stable, slow-growing industry, the University, typical of "research and development" operations elsewhere, is growing at a very rapid rate. The automobile plant exhibits characteristics similar to any large manufacturing operation, fluctuating considerably in response to the national business cycle.

In addition to these "big three" employers, there is a host of industries supplying parts to the automobile industry, as well as independent industries exporting goods which have no relationship to autos. (A map and listing of the major industries in the County are found on the following two pages.) These include the seven gamed industries:

Industry 1 -- Shear Power Company
Industry 2 -- People's Pulp Plant
Industry 3 -- Rusty's Iron Foundry
Industry 4 -- Gestalt Malt Brewery
Industry 4 -- Caesar's Rendering Plant
Industry 6 -- Dusty Rhodes Cement
Industry 7 -- Schick Cannery

Members of the population of APEX County constitute a work force of about 101,000 people, nearly half of them employed by the major "exporting" industries previously mentioned. About 9% of total County employment is found in lighter industry and 41% in commercial and service activities for the resident population. The greatest concentration of manufacturing employment is, as expected, found in the Central City. The highest proportion of white collar workers is in the Suburb, due to the predominance of the University as an employer there. In the futute, it is probable that more and more new industrial growth and employment will occur in outlying areas, particularly among firms requiring significant amounts of land for their plants.

Population

Within the physical and political environment described in the

preceding pages resides a population of some 227,000 persons, a tiny fraction of whom are represented in METRO-APEX as players. The remainder of the population is simulated by the computer in the game. About 63% of the population resides in the Central City, 10% in the Suburb and the remainder in the two Townships.

Only about 9.2% of the County's population is black; however, virtually all of this population is found in the Central City, of which 14.4% of the total population is black, primarily in Ward 1, where the number of non-white households approaches 38%. The only other significant ethnic minority is found in a Mexican-American community in the east-central portion of the city.

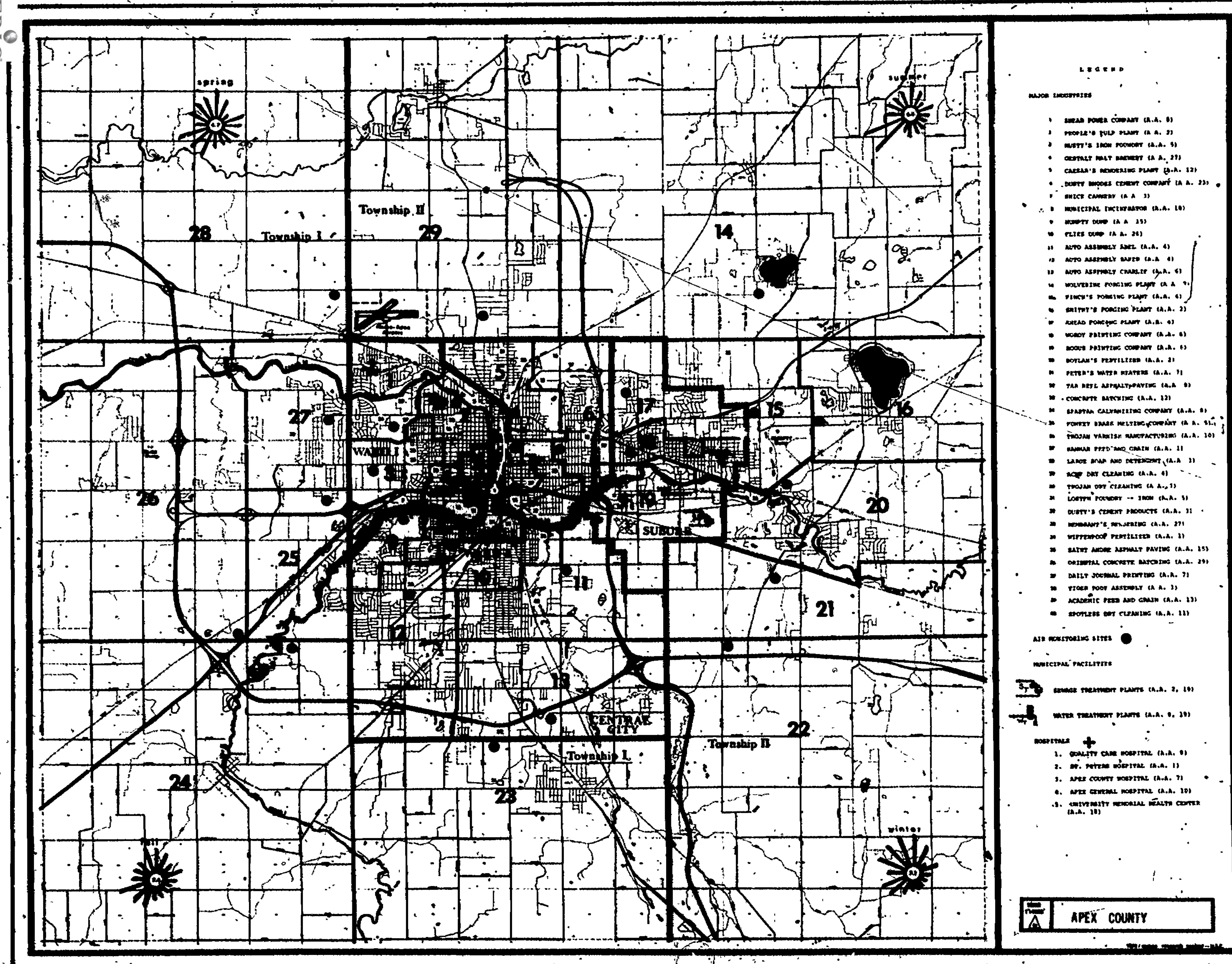
For purposes of the game, the population of APEX County has been divided into five "household types", each representing different occupations and educational achievements, life-styles, voting habits and consumption behavior. These will be described briefly here; more detailed information about each may be found in the Glossary.

Household type 1 is a combination of upper and upper-middle class families whose head of household are likely to be employed in the professions and business management. Household type 2 is typical middle class, occupations usually clerical and lower-level public service areas. Household type 3 includes very low white-collar workers and skilled craftsmen and shop foremen, the latter two predominately. While members of household types 1 and 2 have attended college, some with advanced degrees, household type 3 members are typically high school graduates. In outlying areas, farmers are included in this latter type. In household type 4 are found semi-skilled workers and non-domestic service workers. Usually household heads have not completed high school, and while many household type 4's are homeowners, the value of their housing is quite low. Household type 5 includes laborers, domestic workers and the unemployed, with a large number of the elderly. A majority of these households live in rental units of low value.

Initially, about 17.5% of the County population is found in household type 1, 16% in household type 2 and 27% in type 3; about 32% is of household type 4 and 7.5% fall into household type 5. The household composition of a particular analysis area, and of an entire jurisdiction, will affect significantly the demand for both public and private goods and services. It will also affect voting behavior on financial issues and in elections.

List of Major Industries

1. Shear Power Company (A.A. 8)
2. People's Pult Plant (A.A. 2)
3. Rusty's Iron Foundry (A.A. 5)
4. Gestalt Malt Brewery (A.A. 27)
5. Caesar's Rendering Plant (A.A. 12)
6. Dusty Rhodes Cement Company (A.A. 23)
7. Schick Cannery (A.A. 3)
8. Municipal Incinerator (A.A. 10)
9. Humpty Dump (A.A. 15)
10. Flies Dump (A.A. 26)
11. Auto Assembly Abel (A.A. 4)
12. Auto Assembly Baker (A.A. 4)
13. Auto Assembly Charlie (A.A. 6)
14. Wolverine Forging Plant (A.A. 7)
15. Finch's Forging Plant (A.A. 6)
16. Smithy's Forging Plant (A.A. 2)
17. Ahead Forging Plant (A.A. 6)
18. Wordy Printing Company (A.A.6)
19. Bogus Printing Company (A.A. 6)
20. Boylan's Fertilizer (A.A. 2)
21. Peter's Water Heaters (A.A. 7)
22. Tar Heel Asphalt Paving (A.A. 8)
23. Concrete Batching (A.A. 12)
24. Spartan Galvanizing Company (A.A. 8)
25. Monkey Brass Melting Company (A.A. 5)
26. Trojan Varnish Manufacturing (A.A. 10)
27. Hannah Feed and Grain (A.A. 1)
28. LaRue Soap and Detergent (A.A. 1)
29. Acme Dry Cleaning (A.A. 4)
30 Trojan Dry Cleaning (A.A. 7)
31. Losten Foundry -- Iron (A.A. 5)
32. Dusty's Cement Products (A.A. 3)
33. Rembrants Rendering (A.A. 27)
34. Wiffenpoof Fertilizer (A.A. 1)
35. Saint Andre Asphalt Paving (A.A. 15)
36. Oriental Concrete Batching (A.A. 20)
37. Daily Journal Printing (A.A. 7)
38. Tiger Body Assembly (A.A. 3)
39. Academic Feed and Grain (A.A. 13)
40. Spotless Dry Cleaning (A.A. 11)


LEGEND
MAJOR INDUSTRIES
SWEAR POWER COMPANY (A.A. 8)
PEOPLE'S PULP PLANT (A.A. 2)
RUSTY'S IRON FOUNDRY (A.A. 5)
GESTALT MALT BREWERY (A.A. 27)
CAESAR'S RENDERING PLANT (A.A. 12)
DUSTY RHODES CEMENT COMPANY (A.A. 23)
BRICK CANNERY (A.A. 3)
MUNICIPAL INCINERATOR (A.A. 10)
HUMPTY DUMP (A.A. 15)
PLIES DUMP (A.A. 26)
AUTO ASSEMBLY ABEL (A.A. 4)
AUTO ASSEMBLY BAKER (A.A. 4)
AUTO ASSEMBLY CHARLIE (A.A. 6)
WOLVERINE FORGING PLANT (A.A. 9)
FINCH'S FORGING PLANT (A.A. 6)
SMITHY'S FORGING PLANT (A.A. 2)
AHEAD FORGING PLANT (A.A. 4)
WORDY PRINTING COMPANY (A.A. 6)
BOGUS PRINTING COMPANY (A.A. 6)
BOYLAN'S FERTILIZER (A.A. 2)
PETER'S WATER HEATERS (A.A. 7)
TAR BEEL ASPHALT PAVING (A.A. 8)
CONCRETE BATCHING (A.A. 12)
SPARTAN GALVANIZING COMPANY (A.A. 8)
FORTEY BRASS MELTING COMPANY (A.A. 5)
TROJAN VARNISH MANUFACTURING (A.A. 10)
HANNAH FEED AND GRAIN (A.A. 1)
LARGE SOAP AND DETERGENT (A.A. 3)
ACME DRY CLEANING (A.A. 4)
TROJAN DRY CLEANING (A.A. 7)
LOFTIN FOUNDRY -- IRON (A.A. 5)
DUSTY'S CEMENT PRODUCTS (A.A. 3)
REMBRANT'S RENDERING (A.A. 27)
WIFFENPOOF FERTILIZER (A.A. 1)
SAINT ANDRE ASPHALT PAVING (A.A. 15)
ORIENTAL CONCRETE BATCHING (A.A. 29)
DAILY JOURNAL PRINTING (A.A. 7)
TIGER BODY ASSEMBLY (A.A. 3)
ACADEMIC FEED AND GRAIN (A.A. 13)
SPOTLESS DRY CLEANING (A.A. 11)
AIR MONITORING SITES
MUNICIPAL FACILITIES
SEWAGE TREATMENT PLANTS (A.A. 2, 19)
WATER TREATMENT PLANTS (A.A. 8, 19)
HOSPITALS
1. QUALITY CARE HOSPITAL (A.A. 8)
2. ST. PETERS HOSPITAL (A.A. 1)
3. APEX COUNTY HOSPITAL (A.A. 7)
4. APEX GENERAL HOSPITAL (A.A. 10)
5. UNIVERSITY MEMORIAL HEALTH CENTER (A.A. 18)
APEX COUNTY
spring
summer
winter
Township II
Township I
CENTRAL CITY
SUBURB
WABELL
28
29
14
27
26
25
24
23
22
21
20
16
15
17
13
11

CHAPTER 2

Glossary and Reference Terms

Chapter 2

GLOSSARY AND REFERENCE TERMS

ABATEMENT

Abatement is the reduction of pollutant emissions from a source or sources.

AEROBIC

A process taking place in the presence of oxygen; or a state of liquid containing free dissolved oxygen.

AIR POLLUTION

Air pollution is the presence in the outdoor air of substances which, when present in a sufficient quantity or over a period of time, can cause an undesirable effect upon man, property, or the environment.

AIR POLLUTION REGULATIONS

Air pollution regulations are legal constraints on pollutant emissions, production processes, or control systems. State regulations and County regulations are enforceable by legal sanctions, while recommendations are not.

AIR QUALITY (See NATIONAL AMBIENT AIR QUALITY STANDARDS)

Air quality refers to the pollution concentration characteristics of the atmosphere or ambient air in a given area. It is usually stated in terms of the levels of concentration of specific pollutants, in micrograms of pollutant per cubic meter of air (Mgm/m3) (See CONCENTRATION).

Air Quality Goals are expressions of desirable maximum pollutant concentrations to be achieved through a pollution control program.

Air Quality Criteria - The basic medical and technical information which forms the rationalization from which Air Quality Standards are set. This information is published for each major pollutant by EPA in Air Quality Criteria Documents.

Air Quality Standards are quantitatively-specified maximum levels of pollutant concentrations or dosages, as more precise statements of air quality goals.

AIR QUALITY CONTROL REGION

One of the approximately 250 geographic areas covering the United States which form the basic units for air pollution control activities. These areas were designated by EPA (with the states) and are based on considerations of climate, meteorology, topography, urbanization and other factors affecting air quality.

ALERT STAGES

Alert Stages refer to critical levels of concentration or dosage signaling potential disastrous pollution effects and requiring emergency abatement and control measures.

ANAEROBIC

A process taking place in the absence of oxygen; or a state of liquid containing no free dissolved oxygen.

ANALYSIS AREA (A.A.)

Analysis areas are used as the primary areal reference units for the data and issues throughout the game. The County is divided into a number of analysis areas, each of which is the approximate size of several census tracts. The analysis areas included in the five jurisdictions are as follows:

Jurisdiction 1-- Central City: Ward 1 = AA 1 through AA 4
Ward 2 = AA 5 through AA 8
Ward 3 = AA 9 through AA 13

Jurisdiction 2-- Suburb: AA 17 through AA 19

Jurisdiction 3-- Township 1: AA 23 through AA 28

Jurisdiction 4-- Township 2: AA's 14-16, 20-22, 29

Jurisdiction 5-- County: AA's 1-29

See APEX Analysis Area Map

ANNUAL WAGE

This is the annual cost to the Industrialist of one worker and is an average of the various rates of pay applicable to the different types of workers in the firm. The applicable average wage rate for each firm is reported in the Industrialist's printout each cycle under cost factors. This wage rate may be subject to negotiations with the labor representative and this new negotiated wage rate will supercede the rate found under cost factors on his printout.

ASSESSED VALUE

Assessed value is the value assigned to real estate property for purposes of assessing taxes owed to each of the jurisdiction County and school districts. Governments are required by law to maintain an assessed value of 50% of market value for propert in their jurisdiction, although this requirement is often not met. (E.g. if a residential property is valued on the market at $20,000, its assessed value is $10,000.) (See STATE EQUALIZED VALUE.)

BACKGROUND LEVEL

The amount of pollutants due to natural sources such as marsh, gas, pollen, conifer hydrocarbons and dust.

BOARD OF DIRECTORS

Each Industrialist acts as a Plant Manager and is responsible to the Board of Directors of his plant for his decisions and actions. The Board has the ultimate decision-making power in plant affairs and may approve, amend or reject the manager's fiscal policy proposal. The Board also sets the amount of dividends to be paid to the stockholders.

BONDING

Bonding is the process of incurring public debt to finance some capital improvement project. It is a device used to extend the incidence of costs over a long period of time, rather than have costs met out of current revenues while the project is under construction. Politicians may issue two kinds of bonds, general obligation bonds and revenue bonds. These differ in three respects: (1) the need for voter concurrence, (2) how they are paid off, and (3) the kinds of projects for which they are appropriate. Before Politicians may float general obligatic bonds to finance projects, voters must approve this action in a referendum. There is a State-imposed limit on the indebtednes that a jurisdiction may incur through general obligation bonds. The amount of additional bonded indebtedness that can be sought is indicated in the Politician's output as "$ Limit on Next G.O. Bond Sought". (See DEBT RETIREMENT for the process of financing general obligation bonds.)

Revenue bonds are not submitted to a referendum and are appropriate only for particular projects. (Projects for which they may be used are noted in the Project List.) They are paid off throu fees collected for the service provided by the facility, rather than by taxes.

CAPITAL PLANT INDEX (C.P.I.)

The capital plant index is a ratio of the present dollar value of public capital facilities (sewers, water lines, streets, parks and miscellaneous public holdings) to population equivalents. This number reflects the load imposed on facilities by residents, employees and clients, and this is considered an indication of the relative level of adequacy of these facilites. Present dollar value is calculated each cycle on the basis of depreciated value of existing facilities plus new facilites. (Facilities depreciate at about 5% of original value per year.) (See POPULATION EQUIVALENT.)

CASH CARRYOVER

This is the cash reserve which an Industrialist or Developer carries over to the next cycle after making all his expenditure including those for capital plant. It represents uncommited funds, which the player is free to use in the next cycle.

CASH TRANSFER

A cash transfer is used for loans or gifts of cash between players when the reason for the exchange is unspecified. Revenues made, or expenditures incurred, through an exchange of cash between either the Government, Industrialist, or Developer, are recorded in the budget section of their printout. When applicable, cash transfers are also used to cover the cost of television time and newspaper articles.

CLEAN AIR ACT AMENDMENTS OF 1970

(See LEGAL REFERENCE MANUAL.)

COLLECTION/DISPOSAL STUDY

Studies of municipal house-to-house refuse collection using combinations of different truck types, crew sizes, container locations, transfer stations and disposal sites to determine the capital and operating costs of alternative systems.

COLLOIDAL PARTICLES

Very fine particles of material in fluid suspension; particles will not settle out and can pass through a semipermeable membra

COMBUSTION

Combustion is the process of burning.

CONCENTRATION

Concentration is the ratio of pollutants to effluent gases or ambient air, measured in micrograms per cubic meter (MG/cubic meter) as a weight to volume ratio. Data on mean concentration per quarter, concentration on worst day, and number of days above a specified concentration can be obtained by the APCO, through the installation and operation of monitoring stations.

CONTAMINANT

(See POLLUTANT)

CONTROL EFFICIENCY

Control efficiency refers to the ratio of the amount of a pollutant removed from effluent gases by a control device to the total amount of pollutant without control.

CONTROL STRATEGY

A comprehensive plan designed to control or reduce the level of a pollutant or pollutants in the environment.

CONTROL SYSTEM

Control system refers to equipment and/or procedures intended to reduce the amount of a pollutant, or pollutants, in effluent gases. Each gamed industrial firm has a limited set of control system options for each production process and combustion proces

DEBT RETIREMENT (Debt Service)

Debt retirement, or debt service, is a term used to describe the process of paying off long-term general obligation bonds sold by public agencies. Debt retirement is a budget category of the Politician which includes expenditures for both principal and interest on general obligation bonds. Financing of these expenditures may be with either normal millage or debt retiremen millage.

DEMOLITION COSTS (Clearance Costs)

A demolition cost of 5% of the assessed value of developed PROPERTY must be paid when developed land is rezoned.

DENSITY

In residential areas, density is the term used to express the number of dwelling units per acre of land. In APEX County a different density is associated with each of the five residentia

development types, with the lowest density found in land use category R-1 and the highest in category M-2.

The table on the following page expresses housing density in housing units per acre, and in acres per housing unit.

DEPRECIATION ALLOWANCE

Each cycle, the total value of industrial capital facilities, (building and equipment) depreciates at 8%. A tax credit of 5% of the capital value of these facilities is allowed the Industrialist to compensate for this depreciation. The amount is deducted before Federal and State income taxes are paid. The Industrialist may claim any part of his maximum allowance; any portion of the allowance not taken will accumulate. The maximum depreciation allowance is listed under cost factors in the Industrialist's printout.

DEVELOPMENT TYPES AND COSTS

A. Residential

In APEX County there are various levels of cost and density associated with different qualities and sizes of housing which may be built by Developers. These costs are for structures, exclusive of land and site improvements.

Single Family

Three different development-cost levels are applicable to APEX County single-family housing units, ranging from the highest construction cost of $40,000 (designated as R-1) to the lowest cost housing, built at $15,000 per unit (designated as R-3). Any one of these types may be built on land which, when vacant, is zoned R.

Multiple Family

Units of two different cost levels, M-1 and M-2 are available for construction of multi-family housing in APEX County. The highest cost per unit, for M-1, is $30,000 and the lowest, for M-2, is $12,000. Either of these types may be constructed on vacant land zoned M.

Residential Development Costs Per Unit

R-1	R-2	R-3	M-1	M-2
$40,000	$22,500	$15,000	$30,000	$12,0

HOUSING DENSITY

AA	R-1		R-2		R-3		M-1		M-2	
	Units Per Acre	Acres Per Unit	Units Per Acre	Acres Per Unit	Units Per Acre	Acres Per Unit	Units Per Acre	Acres Per Unit	Units Per Acre	Acres Per Unit
1	1.4	.714	3.5	.286	5.6	.179	11.2	.089	21.0	.048
2	2.4	.410	6.0	.167	9.6	.104	19.2	.052	36.0	.028
3	2.0	.500	5.0	.200	8.0	.125	16.0	.063	30.0	.033
4	2.8	.357	7.0	.143	11.2	.089	22.4	.045	42.0	.024
5	2.1	.476	5.25	.190	8.4	.119	16.8	.060	31.5	.032
6	1.6	.625	4.0	.250	6.4	.156	12.8	.078	24.0	.042
7	2.5	.400	6.25	.160	10.0	.100	20.0	.050	37.5	.027
8	3.0	.333	7.5	.133	12.0	.083	24.0	.042	45.0	.022
9	1.2	.833	3.0	.333	4.8	.208	9.6	.104	18.0	.056
10	2.5	.400	6.25	.160	10.0	.100	20.0	.050	37.5	.027
11	1.0	1.000	2.5	.400	4.0	.250	8.0	.125	15.0	.067
12	1.0	1.000	2.5	.400	4.0	.250	8.0	.125	15.0	.067
13	1.0	1.000	2.5	.400	4.0	.250	8.0	.125	15.0	.067
14	.5	2.000	1.25	.800	2.0	.500	4.0	.250	7.5	.133
15	.6	1.667	1.5	.667	2.4	.417	4.8	.208	9.0	.111
16	.8	1.250	2.0	.500	3.2	.313	6.4	.156	12.0	.083
17	1.2	.833	3.0	.333	4.8	.208	9.6	.104	18.0	.056
18	2.3	.435	5.75	.174	9.2	.109	18.4	.054	34.5	.029
19	3.0	.333	7.5	.133	12.0	.083	24.0	.042	45.0	.022
20	.8	1.250	2.0	.500	3.2	.313	6.4	.156	12.0	.083
21	.5	2.000	1.25	.800	2.0	.500	4.0	.250	7.5	.133
22	.4	2.500	1.0	1.000	1.6	.625	3.2	.313	6.0	.167
23	.7	1.429	1.75	.571	2.8	.357	5.6	.179	10.5	.095
24	.3	3.333	.75	1.333	1.2	.833	2.4	.417	4.5	.222
25	.4	2.500	1.0	1.000	1.6	.625	3.2	.313	6.0	.167
26	.3	3.333	.75	1.333	1.2	.833	2.4	.417	4.5	.222
27	.6	1.667	1.5	.667	2.4	.417	4.8	.208	9.0	.111
28	.3	3.333	.75	1.333	1.2	.833	2.4	.417	4.5	.222
29	.5	2.000	1.25	.800	2.0	.500	4.0	.250	7.5	.133

B. Commercial

Two types of commercial land use are allowable in APEX County. These relate to local neighborhood shopping facilities and to regionally-oriented commercial and service facilities. Both may be built only on zoning category "Commercial" land. Each is developed on a cost-per-acre basis, as follows:

Commercial Development Costs by Type

CL	CR
$100,000	$125,000

C. Industrial

Endogenous industrial development permitted Developers in APEX County is on a per-acre basis, the cost being $100,000 per acre. Zoning category I land may be developed into this land use.

(See ZONING CATEGORY.)

DOSAGE

The accumulated exposure of a person, plant, materials, etc., to a particular concentration of pollutant for a specified period of time.

DUMP

A site where uncontrolled disposal of solid waste occurs.

EFFLUENT

An effluent is a gaseous or liquid discharge or emission.

EFFLUENT SAMPLES

An effluent sample is an industrial outflow water sample and analysis which provides data on seven water pollutant parameters. A sample may be ordered by the Water Quality Manager and is taken at the source specified by the WQM.

ELITE OPINION POLL (E.O.P.)

The Elite Opinion Poll calls for a vote of all game players on certain major policy issues in the community. These issues appear as headlines in the METRO-APEX NEWS, which ask for either a deciding or advisory vote. The results of the Poll affect public officials' chances of reelection, as well as the probability of passage of general referenda, specific bond issues and special millage requests..

EMERGENCY EPISODE

An air pollution incident in which high concentration of pollutant(s) occur in the ambient air contributing to a significant increase in illness or death.

EMISSIONS

Emissions are pollutants in effluent or exhaust gases which are released into the air.

EMISSION FACTORS

Emission factors are estimates which can be used to approximate the rate of emissions of specific pollutants from generalized sources.

EMISSION INVENTORY

A compilation of the rate of pollution emissions in a given area by source type.

EMISSION MEASUREMENT

Air pollution emissions are measured in pounds per hour for particulates, sulfur dioxide (SO2), carbon monoxide (CO), nitrogen oxides (NOx), and hydrocarbons (HC); in Ringelmann number for smoke; and in Stinkelmann number for odor. The emissions measured are of specific pollutants from specific sources.

EMISSION RATE

Emission rate refers to the amount of pollutant emitted per unit of time or throughput. Maximum allowable emissions will be specified in pounds per hour (or pounds per 1000 pounds of process rate) if they refer to emission rates.

EMISSIONS SOURCE

An emission source is the origin of some specific air pollutants. In the game there are several gamed point sources, about thirty non-gamed point sources, plus motor vehicles and space heating as line and area sources, respectively.

ENVIRONMENTAL IMPACT STATEMENT

The results of a study which identifies and evaluates the adverse or beneficial environmental effects of pursuing a proposed action, pursuing an alternative action or not pursuing the proposed action.

EXOFIRM (EXOGENOUS FIRM)

An Exofirm is an industry or bureaucratic firm that depends primarily upon markets outside the local area for its growth and vitality. These firms are usually classified as Exofirms on the basis of their being net importers of dollars and net exporters of products or services to these outside markets. Jobs created by Exofirm growth spur additional growth of households and jobs oriented to the local market. (Exofirms are also often referred to as basic firms).
In APEX County, Exofirms locate in industrial and office zoning categories. Periodically, the newspaper will note the opportunity for Developers or Industrialists to invest, in a speculative way, in the entry of new Exofirms into the metropolitan area, with a variable probability of success attached to such investments. Occasionally, these Exofirms require rezoning of land and/or installation of special capital improvements. Requirements for such special public action and requests for private investment will be noted in the newspaper announcement of the firm's interest in locating in the area.

FEDERAL WATER POLLUTION CONTROL ACT AMENDMENTS OF 1972

(See LEGAL REFERENCE MANUAL)

FUEL RATE

The amount of fuel consumed by each industry per unit of time is specified in tons/hours for coal, in barrels (bbl)/hour for oil, in thousand cubic feed (MCF)/hour for natural gas, and in megawatts (MW) for electricity.

FUEL TYPE

The fuel types for industry include: low-grade coal (Lo-Coal), high-grade coal (Hi-Coal), low grade oil (Lo-Oil), high-grade oil (Hi-Oil), natural gas, and electricity. The fuel option for each plant is listed in the Industrialist's printout. The fuel grade refers inversely to the air pollution potential of the burining fuel, i.e., Lo-Grade has higher pollution potential, and Hi-Grade fuels have low pollution potential.

GARBAGE

The food waste portion of solid waste.

HAZARDOUS AIR POLLUTANTS

Air pollutants not covered by the Air Quality Standards but which, in EPA's judgement, "may cause, or contribute to, an increase in mortality or --- serious illness." These pollutants generally are toxic substances such as mercury, cadmium, asbestos and beryllium.

HAZARDOUS WASTE

(See "SOLID WASTE TYPE")

HOUSEHOLD/COMMERCIAL REFUSE

(See "SOLID WASTE TYPE")

HOUSEHOLD TYPES

The five household types used in APEX County are characterizations of families belonging to fairly homogeneous socio-economic groups. These characterizations reflect life style, political involvement and voting habits, general consumption behavior and preference for public goods. There is substantial overlap of income levels for all status groupings; hence income, alone, is a weak indicator for characterizing households.

Household Type I -- is upper class and upper-middle class combined. Occupations of the heads of households are: professionals, technical workers, managers, officials, and proprietors. One-half of the family income levels are in excess of $15,000 and the other half are in the $10,000-$15,000 range. Value of housing is in excess of $20,000, and if they rent, rentals are over $150 per month. This is the group which is most concentrated in residential locations. Education of the head of the household is at least college graduate, often with post-graduate study. Interest group membership for this household type is found in the Business Community and Effective Government Groups.

Household Type II -- is the typical middle-class household in which the head of households occupation is clerical, sales, or kindred types. Income of the family is primarily in the $7,000-$10,000 range. Education of the head of the household is some college or at least high school graduation.

Housing value is primarily in the $15,000-$25,000 range, and gross rentals would usually be from $100 to $149 per month, though they may be somewhat lower. Interest group affiliations for this type are with the Effective Government Groups on the one hand, and with the Right-wing Conservatives on the other.

Household Type III -- the most numerous and widely-distributed of the five types is characterized by a mixed membership of very low income white collar workers, skilled craftsmen, and foremen, though the latter two predominate. In the outlying areas, farmers fall into this category. Family income is primarily in the $5,000-$9,000 range. The head of the household's education is typically high school graduation. Housing value is usually in the $12,000-$20,000 range and rentals are from $80-$125 per month. Members of this group are apt to belong to the Labor Vote and/or the Right-wing Conservative interest groups.

Household Type IV -- is composed of semi-skilled workers, industry operatives and non-household service workers, such as waiters, barbers and parking-lot attendants. Family income is in the lower portion of the $4,000-$7,000 range. Housing values range from $10,000 to $14,000 with gross rentals being $70 to $90 per month. Education of the head of the household is usually 9 to 11 years. Interest group membership for this household type is found in the Labor Vote and among the Civil Rights Groups.

Household Type V -- is the lowest stratum of society, and heads of households are laborers or household service workers. The vast majority of the area's unemployment are of this type and roughly half of all members are elderly and retired. Family income is less than $5,000 annually and the value of housing is less than $10,000, with rentals primarily $50-$75 per month. Heads of households have usually not been educated beyond the eigth grade. Membership in interest groups is found in the Labor Vote and Civil Rights Groups.

Political involvement of the five household types declines from Type I (the highest) to Type V, the latter being generally apathetic. Likewise, concern with government operation and provision of public services is highest in Type I households and declines steadily through Type V families.

The five household types will tend to demand housing of the five residential development types according to the following percentages:

Household Type I -- 50% will choose R-1; 30% R-2 and 20% M-1

Household Type II -- 20% will choose housing in each of the five development types

Household Type III -- 10% prefer R-1; 30% prefer R-2; 20% choose R-3; 25% take M-1, and 15% M-2

Household Type IV -- 20% will choose R-2; 40% R-3; 10% M-1, and 30% M-2

Household Type V -- 40% will be in R-3; 60% in M-2

IMPLEMENTATION PLAN

Under the 1970 Clean Air Act, each state must prepare and have approved by EPA an Implementation Plan which details the methods, strategies and timetable which the state and its jurisdictions will employ to meet and maintain the Air Quality Standards within the control region(s) within its jurisdiction.

IMPROVEMENT COSTS

Improvement costs are fees to prepare raw land for development, including subdivision costs, sewer and water connections, drainage and engineering. Developers are required to pay improvement costs on all land on which they build structures. For residential property, improvement costs are on a per unit basis as follows:

R-1	R-2	R-3	M-1	M-2
$1,000	$800	$700	$600	$400

For commercial and local industrial land uses, improvement costs are on a per acre basis; for each the fee is $5,000 per acre.

These fees are automatically applied to all land on which the Developer builds.

INTEREST GROUPS

In APEX County there are 5 major political interest groups that take stands on public policy issues and have a significant impact upon voting behavior. The more extreme the position assumed by one of these interest groups (as indicated on a scale of +4 to -4), the greater will be the voter turnout surrounding any particular referenda or election. Each of these interest groups derive their constituency from among two or more of the "Household Types" (See HOUSEHOLD TYPES)

1. CIVIL RIGHTS GROUPS: The orientation of these groups is primarily towards issues such as fair employment, neighborhood improvement, and problems that affect minorities. Their leadership is drawn from the elite liberals or the ghetto activists, their membership from the lower social strata. Their mode of operation is typically public protest and demonstrations centered around a very specific policy issue or community problem, and their influence on the system as a whole is moderate.

2. EFFECTIVE GOVERNMENT GROUPS: Are overwhelmingly middle class, composed primarily of professional people, a large percentage of them women. These groups are interested in a wide range of issues, on which they exert moderate influence. their orientation is towards governmental efficiency and towards community growth and image.

3. BUSINESS COMMUNITY: Draws from the whole range of commercial and mercantile interests, as well as some from the professional areas such as law, engineering and medicine. The business community exerts the highest degree of power of all politically oriented interest groups; their interest is directed primarily at community image, growth, and "BOOSTERISM".

4. LABOR VOTE: Are more conservative locally than nationally and exhibit some divergency between craft unions and industrial unions, the former being more conservative. The labor vote exert moderate influence on a range of issues somewhat less broad than those of interest to the "Effective Government Groups". The conservatism of the labor vote is especially apparent in the opposition of some of its constituency to public spending for social welfare.

5. RIGHT-WING CONSERVATIVES: Draws its membership primarily from people who resist change and advocate conserving the "traditions of Americanism--God and Country." They are generally against social change, increases in government influence in local affairs and public spending on social programs. Since these groups do not advocate change, they usually only become actively involved in public issues as a reaction to public programs proposed by other groups.

INTEREST RATE

The cost of borrowing money will vary for the Industrialists and Developers according to both their credit rating and the length of the loan, i.e., how many years will be taken to repay it. The maximum number of years on any loan by an Industrialist or Developer is 20 years. Applicable interest rates as follows:

Years to Repay	Credit Rating A-1	A-2	A-3
1-2	4%	6%	8%
3-5	6%	8%	12%
6-10	8%	12%	16%
11-20	12%	16%	20%

The cost of borrowing money for governmental agencies, the interest rate on bonds, will vary according to the credit rating of the jurisdiction, and will differ between general obligation and revenue bonds. Since revenue bonds are not backed by governmental taxing power they are riskier and therefore carry higher interest rates than general obligation bonds. As a jurisdiction's credit rating falls from A-1 to A-3, the interest rate on general obligation bonds will increase from 4.5% to 6%.

INVERSION

A layer of air trapped near the ground by a layer of warmer air above it.

ISSUE

Issue is used to refer to a problem situation presented to players in the METRO-APEX NEWS. Following each issue are two to four alternatives one of which must be selected by the player.

(See ELITE OPINION POLL)

JURISDICTION

Jurisdiction refers to one of the political units in APEX County. Abbreviations used in the game are:

(Jurisdiction 1) CC - Central City
(Jurisdiction 2) SUB - Suburb
(Jurisdiction 3) TW 1 - Township 1
(Jurisdiction 4) TW 2 - Township 2
(Jurisdiction 5) Co - County

(See ANALYSIS AREA.)

LAND USE

Land use is a term used to refer to the spatial distribution of City and rural functions--its residential communities or living areas, its industrial, commercial and retail business districts or major work areas and its agricultural, institutional and leisure time functions.

(See DEVELOPMENT TYPE and ZONING CATEGORY.)

LEACHATE

Water moving vertically through the soil of a landfill that may become contaiminated from the waste material in the fill.

MAXIMUM PRODUCTION CAPACITY

This is the maximum number of units which can be produced by a gamed industry in a cycle, with the plant and equipment in existence during that cycle. Maximum capacity may be increased by making capital expenditures for building and equipment. New productive capacity becomes available only in the cycle following that in which money is budgeted for plant expansion.

MEAN PROBABLE NUMBER PER 100 ml (MPN/100 ml)

A measure of the amount of coliform organisms per unit volume. By using quantities of sample varying in geometric series i.e., 0.01, 0.1, 1.0 milliliters, and by applying the usual test for coliform organisms, it is possible to determine a statistical estimate or "most probable number" of coliform organisms per 100 ml of water.

MICROGRAMS PER CUBIC METER

The weight of a substance in 1/1,000,000 of a gram contained in one cubic meter of volume.

MILLAGE

Millage is the tax rate, in mills, which is applied to State equalized property value to generate property tax revenue. One mill is equal to a $1 charge on each $1000 of value, or one tenth of one percent of the State equalized value. There are three types of millage:

A. Normal Operating Millage is determined by local Politicians and is applied to standard operating costs of government by State and local law -- the local limit can never be higher than the limit set by the State.

B. Special Millage, which is not subject to State and local limits, can be used for financing special programs. It must be voted and passed on in a referendum.

C. Debt Retirement Millage is not subject to the State and local limits but it can be used for retiring general obligation bonds. This millage requires a favorable vote in a referendum.

Total millage is the sum of operating millage, any special millages and the debt retirement millages which may be in effect during the year.

MILLIGRAMS PER LITER (mg/l)

Weight per unit volume. For water effluents, milligrams per liter is used to express the concentration in terms of the weight in milligrams of a dissolved or suspended pollutant in one liter of water.

MONITORING STATION

A monitoring station is a facility that houses air quality monitoring equipment for measurement of ambient air quality. One air quality monitoring station may be installed and operated in any analysis area. The pollutants measured at each monitoring station are:

Particulates, SO2, CO, NOx, and Hydrocarbons

Each pollutant is measured by a different type of monitoring equipment.

(See AIR QUALITY)

NATIONAL AMBIENT AIR QUALITY STANDARDS

EPA has set Primary and Secondary Air Quality Standards which are the maximum concentration of air pollutants allowable by federal law. Primary Standards are based on protection of the public health and are to be achieved as a first priority. Secondary Standards are based on the public welfare and will be achieved as a second priority.

NATIONAL ENVIRONMENTAL POLICY ACT (NEPA)

(See LEGAL REFERENCE MANUAL)

OFF GASSES

Gasses arising from landfills or other solid waste conversion (such as thermal) operations and leaving the site of generation.

PLANNED UNIT DEVELOPMENT

A planned unit development is an allocation of density to a development site such that the overall density meets the zoning requirements, but within the site certain areas may be of a higher concentration than those other developments around this site. This allows the Developer more flexibility in designing planned neighborhoods.

(See DENSITY)

PLANT INSPECTION

A plant inspection is an "on-site" examination of production and pollution control equipment, processes and procedures. Plant inspections ordered by the APCO will provide him with information on the production processes; production capacity; fuel and process rates; control systems; smoke code (Ringelmann number); and odor code (Stinkelmann number) for each process of a specific gamed or non-gamed emission source.

PLANT MANAGER

The player in the role of Industrialist is acting as a Plant Manager.

(See BOARD OF DIRECTORS.)

POLLUTANTS

Air Pollution:

(1) Particulates: particulate matter is any material (except uncombined water) which exists in a finely divided form as a liquid or solid at standard conditions.

(2) Sulfur Dioxide (SO_2) is a pungent colorless gas which is commonly emitted from the combustion of sulfur containing compounds, especially fuels such as coal and fuel oil. Sulfur dioxide can also be emitted from chemical process plants, metal process plants and trash burning incinerators.

(3) Carbon Monoxide (CO) is a colorless, odorless, very toxic gaseous product of the incomplete combustion of common fuels. It can also be generated by metabolic processes and the partial oxidation of carbon-containing compounds such as limestone. Carbon monoxide adversely affects human respiration by interferring with the body's ability to assimilate oxygen.

(4) Oxides of Nitrogen (NOx) are formed when oxygen and nitrogen are heated to a high temperature. Sufficiently high temperatures to produce significant amounts of NOx are normally only reached in modern efficient combustion processes such as electric power plants and automobile engines. Oxides of nitrogen in combination with hydrocarbons and sunlight are major constituents of photochemical smog.

(5) Hydrocarbons (HC) are compounds containing combinations of hydrogen and carbon. Gaseous hydrocarbon air pollutants are most commonly emitted from the incomplete combusion of fuels such as gasoline, coal, oil and gas from the production, handling and evaporation of gasoline, paint thinners, solvents, etc. Hydrocarbons along with oxides of nitrogen and sunlight are important in the generation of photochemical smog.

Water Pollution:

(1) Biological Oxygen Demand - B.O.D. is the amount of oxygen needed by any polluted water or sewage to allow micro-organizms to consume the suspended and dissolved biodegradable organic material found in the liquid under aerobic conditions.

(2) Coliform Bacteria - Micro-organisms found in sewage serving as the indicator of bacterial contamination in water quality.

(3) Dissolved Oxygen (D.O.) is the amount of oxygen found and available for biochemical activity with a given volume of water (mg./l.). The saturation point is dependent upon temperature, chemical characteristics of the water, and barometric pressure.

(4) Nutrients - Nutrients are phospates, nitrates, nitrogen and phosphorus released as waste from certain industries or produced from agricultural and urban runoff.

(5) Thermal Pollution - The increase in temperature of surface waters as a result of the use of these

waters for cooling purposes by industry or public facilities. The heat accelerates biological processes in the stream, resulting in reduction of oxygen content of the water.

(6) Total Dissolved Solids (T.D.S.) - The amount of solids, dissolved in a given volume of water (mg./l).

POPULATION EQUIVALENT

The population equivalent is a means of converting (a) residents, and (b) employees and clients of industries and commercial facilities into a standard measure of the demand placed on such public capital facilities as sewers, streets, and water supply. The population equivalent of an area (analysis area or jurisdiction) is computed as follows:

P.E.= [Total households]+[.3 x all employees of commerce and industry]

For use of population equivalents in APEX County, see CAPITAL PLANT INDEX.

PROCESS RATE

Process rate refers to the amount of materials processed by an Industrialist per unit time. The measure is specified in tons, pounds, barrels, per minute, per hour, etc.

PRODUCTION LEVEL

This is probably the key item determined by an Industrialist each cycle. It is the number of units of a product his plant will produce in that cycle. The Industrialist is free to set his production at any level he chooses, as long as the figure he sets does not exceed his maximum production capacity.

PRODUCTION PROCESS

A production process is a definable part of the overall production system of a given firm. Each gamed industrial firm may have up to five production processes, while each non-gamed industrial firm is assumed to have only one process.

PROMPT SCRAP

Wastes that are recycled for direct reuse without entering the solid waste stream.

QUASI-PUBLIC LAND

This is land owned by tax-exempt organizations such as churches and fraternal organizations. Such land includes church buildings and schools, cemeteries and such miscellaneous buildings as Elks lodges, etc.

REACH

A reach is a generally homogeneous segment of a river or stream. Often in water quality management typical measurements of water quality from any point in the reach are used as representative of the entire reach.

REFERENDUM

A referendum is a vote of the (simulated) population of a jurisdiction on some issue presented to the people by the Politician. Most usually referenda are called to approve (or reject) a general obligation bond issue or a request for special millage, although they may be called to approve some legislative matter, such as open housing.

REFUSE

A term applied broadly to mixed solid waste including food waste, trash, street sweepings, and non-toxic solid industrial wastes.

REZONING APPLICATION FEE

The rezoning application fee is a charge of $100, which is assessed for each rezoning request submitted by a Developer or Industrialist. It is included in that player's financial statement for the next cycle.

RINGELMANN NUMBER

The Ringelmann Number is a scale for measuring the blackness of smoke fumes and is equivalent to the opacity. Ringelmann Numbers and opacities are used for specifying allowable smoke emissions (Ringelmann for black and opacity for other colors). #0 = zero opacity #1 = 20%, #2 = 40%, #3 = 60%, #4 = 80%, #5 = 100%. In APEX County, all smoke readings are reported as Ringelmann Numbers.

SALVAGE

The recovery for reuse of any valuable component from the solid waste stream.

SANITARY LANDFILL

An operation where solid waste is deposited in the ground in a controlled manner. The waste is compacted when delivered and covered daily. APEX County can have three classes of sanitary land fills. (See below.)

SANITARY LANDFILL--Class I

A site where disposal of toxic or hazardous industrial waste (solid waste type 1) is permitted due to the geology and soil characteristics. Solid waste type 2 and 3 may be deposited in this class site.

SANITARY LANDFILL--Class II

A site where only non-toxic or non-hazardous waste may be deposited. These sites receive primarily mixed municipal refuse (solid waste type 2). Solid waste type 3 may also be deposited in this class site.

SANITARY LANDFILL--Class III

A site where only solid fill (solid waste type 3) may be deposited.

SEWAGE TREATMENT LEVELS

Primary Treatment - A series of mechanical treatment processes including screening and sedimentation, which removes most of the floations and suspended solids found in sewage, but which have a limited effect on colloidal and dissolved material.

Secondary Treatment - A series of biochemical, chemical, and/or mechanical processes which remove, oxidize or stabilize nonsetteable, colloidal, and dissolved organic matter following primary treatment.

Tertiary Treatment - Any sewage treatment process that has the capability to remove over ninty-nine percent of the pollutants in sewage if it follows secondary treatment.

SOIL PERMEABILITY

A measurement of the water porosity of soil; soil porosity measured in gallons per day of water which will be absorbed by one square foot of soil surface.

SOIL SURVEY

An engineering/geological survey of an analysis area which provides data on the water table level, soil type, and soil permeability. These parameters are important criteria to determine the suitability of an A.A. for Class I, II, or III sanitary land fills.

SOIL TYPE

Three predominent soil types are found in APEX County--clay, sand or gravel.

SOLID WASTE

Any waste that can be handled as a solid rather than a liquid.

SOLID WASTE DISPOSAL

The end point of solid waste handling; may include open dumps, sanitary land fills, incinerators, composting, hauling out of APEX County by contract, salvage and recycle, etc.

SOLID WASTE SOURCES

Solid wastes are generated from various sources as --

Household - Solid wastes from residences.

Commercial - Solid wastes derived from non-industrial commercial operation.

Industrial - Wastes produced as a result of manufacturing or related industrial operation.

Municipal - Mixed Household and Commercial waste that may contain some street cleaning wastes and industrial solid wastes.

Agricultural - Wastes derived from basic crop or animal operation including waste vegetables, minerals and animal manure.

SOLID WASTE TYPE

APEX County solid wastes are specified as one of three following types--

S.W. Type 1 - Hazardous Wastes; includes sewage sludge, pesticides, industrial chemicals, etc., (Only small quantities of high toxic wastes and radioactive wastes are generated in APEX County and these are not included in Type 1 wastes.)

S.W. Type 2 - Household/Commercial Refuse; includes trash, rubbish, garbage and decomposable organic refuse from commercial and household operations picked up by regular route collection.

S.W. Type 3 - Solid Fill; includes bulky non-water soluable, non-decomposable inert solids from municipal and industrial operations, demolition, etc. Examples are earth, rock, gravel, concrete, asphalt paving fragments, clay, glass, and rubber products.

Industrial wastes are distributed among the above three categories depending upon the characteristics of the particular waste.

SOURCE TYPES (AIR POLLUTION)

Point Source - A stationary source of pollution which has the potential of emitting a substantial amount of pollutant(s) such as a factory or power plant.

Line Source - A moving source of pollutants such as automobiles, buses, trains, and aircraft.

Area Sources - The sum of numerous widespread small stationary pollution sources as the space heaters in buildings.

Indirect or Complex Source - Stationary facilities or developments which indirectly generate substantial pollution by means of activity associated with them (such as vehicle traffic generated by shopping centers, sports complexes, airports, etc.)

STANDARDS OF PERFORMANCE

Direct limitations of pollutant emissions from certain types of high pollution sources (power plants, etc.) set by EPA and/or the states.

STATE EQUALIZED VALUE

State equalization is a process designed to even out differences in assessment practices among political jurisdictions. The state equalization factor applied to each jurisdiction's assessed value may thus be different. The state equalized value for a jurisdiction, reached by applying the factor to local assessed value, is the base on which millage is levied to generate property tax revenues.

STINKELMANN NUMBER

The Stinkelmann Number is a scale (developed in APEX County) for measuring odor emissions, and for specifying maximum allowable odor emissions. Numbers range from 0-5, covering least to worst odor levels, respectively.

TAX RATE

See HILLAGE

TRANSFER STATION

Site at which wastes are transferred from small compacter vehicles to larger long distance transport vehicles.

TRASH

The non-food, non-putrescible fraction of solid waste.

UNIT COSTS

The costs to the Industrialist of operating his plant are calculated, for each production component, except labor, on the basis of the amount and cost of each component required to produce one unit of the product. These unit costs apply to fuel, administrative overhead, inventory, and raw materials.

Fuel Cost applies to the fuel required to produce each Industrialist's product and will be different for each fuel type.

General Administrative Costs include all overhead expenditures, other than salaries, involved in production.

Inventory Carrying Costs must be paid to store product inventory from one cycle to the next. This cost excludes taxes on inventory.

Materials Costs include all raw materials required to produce the product, except fuel.

The unit costs for each of these components which are applicable for a particular Industrialist for the next year are included in that player's output.

UNIT SALES PRICE

This is the price, which an Industrialist sets each cycle, at which he will sell a unit of his product. Each Industrialist except the power plant has complete control over price; although the number of units he actually sells

will be dependent on the relationship of his price to supply-demand conditions in the general market, and to the current average industry-wide price (reported for the last three years in the Industrialist's output).

WATER QUALITY SAMPLES

A water quality sample is a water sample and analysis providing data on seven water pollutant parameters. The water quality manager may order water samples and designate the location from which they are to be taken.

WATER TABLE LEVEL

The distance from the surface of the ground to the underlying ground water level.

ZONING CATEGORY

Zoning categories apply only to vacant land for APEX County. Each of the six zoning categories may be developed into one or more types of land use:

FROM	TO
Zoning Category	Developed Land use Type(s)
(1) R - Single-family residential	(1) R-1 (low density, high cost) (2) R-2 (med. density, med. cost) (3) R-3 (high density, low cost)
(2) M - Multiple-family residential	(4) M-1 (low density, high cost) (5) M-2 (med. density, low cost)
(3) C - Commercial	(6) CL (Commercial-Local) (7) CR (Commercial-Regional)
(4) I - Industrial	(8) IL (Local industry) (9) IX (Exogenous industry)
(5) O - Office	(10) O (Exogenous office)
(6) A - Agricultural	(11) A (Active farming)

CHAPTER 3

Role Description

Chapter 3

SOLID WASTE MANAGER ROLE DESCRIPTION

Generally speaking, the Solid Waste Manager (SWM) role in METRO-APEX is concerned with the management of all types of solid waste. He does this through effective planning and coordination of County activities related to generation, collection, transfer, processing, and disposal of both City and County solid wastes. The primary mission is to provide comprehensive environmental protection in the area of solid waste management as a part of the environmental management program of APEX County.

The specific area of operation of the SWM is intentionally general with no specific limitations or constraints imposed on what constitutes solid waste management. The challenge to the SWM is to assess the nature of the problem, to design a management system to correct the problem and to implement, operate, and revise that management system. The remainder of this chapter attempts to acquaint the new SWM with the solid waste management issues in general, and specifically those he will confront in APEX County. The chapter ends with a proposed set of specific functions for the SWM's considerations.

Solid waste in APEX County has been growing at an increasing rate over the last ten years. Until recently the open burning dumps and the City incinerator were sufficient to dispose of this waste. But environmental pressures are closing the dumps and threatening to close the incinerator forcing a crisis situation in disposing of this growing amount of solid waste.

These difficulties are compounded by the number of governmental institutions whose activities affect solid waste management. The programs, administrative authorities and responsibilities are diffused and distributed within the local governments resulting in the fragmented approach to solutions. The Public Works Department operates refuse collection, condemnation, and street cleaning. The Public Health Department administers health and safety regulations, and inspects public disposal sites, and regulates private solid waste collection contractors. This situation, where responsibility is diffused, results in ineffectiveness, duplication of effort, and lack of coordination of the various programs which concern solid waste management. In an attempt to bring order to this chaotic situation, the Board of Supervisors recently established the Environmental Quality Agency, and directed it to develop and administer an integrated environmental management program for APEX City and County.

The Environmental Quality Agency (EQA) is charged with the duty of administering and coordinating APEX County's environmental protection activities. To this end, the EQA will normally direct and coordinate the activities of the Air Pollution Control Office and the recently established Water Quality Management and Solid Waste Manager Offices. In addition, the EQA has responsibility for several other areas of environmental concerns including pesticides, noise pollution, and radiation.

An evaluation of the practical changes required by the establishment of the EQA indicates that the SWM can use this transitional period to institute changes in the governmental organization and increase the effectiveness of solid waste management programs. The SWM could benefit by a restructuring of some governmental functions to include consideration for solid waste.

Like other individuals in the APEX community, the SWM receives computer printout at the beginning of each cycle of play. This printout is a record of the decisions made and funds spent by the SWM in the previous cycle. The printout also contains information which may guide the SWM's and Politician's decisions in the next cycle.

The computer printout consists of the following elements: (1) SWM Office Budget; (2) Soil Survey; (3) Collection/Disposal Studies (household refuse only); (4) Generation of Solid Waste; (5) Collection Truck Fleet Data; (6) Collection/Disposal Systems in Operation, and (7) Disposal Site Data. Based upon this data the SWM will recommend policy to the City Politicians who control Central City refuse collection systems and expenditures (crew size, trucks, fees, etc.) and the City refuse incinerator, and the County Politicians who control solid waste disposal sites in the County, and private collection contractors. County wide decisions will be made jointly by the City and County Politicians through coordination with the EQA.

The SWM Office will be directing its efforts to three major areas of concern: assessing the nature, magnitude, condition and trend of solid waste problems in APEX County; development and implementation of an improved solid waste management system for the County; and administering the operation of an effective waste management program. The planning function performed by the SWM is of critical importance. The plan which is developed must be considered within the context of the overall environmental quality plan for APEX County. As such, the SWM competes for limited resources with the APCO, WQM, and other environmental programs.

Elimination or prevention of solid waste is not currently practical in the same way as it is possible to control or eliminate air or water pollution. The main realistic options are

reduction, recycling, and management. The collection and the disposal of solid waste quickly, safely, and as efficiently as possible without creating a health hazard is of first concern. The SWM should look to ways of reducing the solid waste that enters the solid waste stream from households (representing over 50% of all solid waste), business and industry, and general demolition. Perhaps recycling of solid waste at its source or through governmental or private facilities is a method of "control" or management of solid waste which the SWM should consider in a policy plan.

In Summary:

Some primary duties and functions of the Solid Waste Manager are as follows:

1. Analyze, with available data and with various surveys and studies, the present solid waste systems in APEX County and potentially more efficient and less costly alternatives.

2. Develop solid waste management plans, after coordination with Planners, EQA, Politicians, etc., dealing with generation, collection, transfer, processing, and disposal.

3. Work with City and County Politicians on implementation of the Plan recommending capital projects, legislation, and system changes (i.e. collection mode).

4. Identify and implement new and innovative methods for recycling and reduction of solid waste generation.

5. Encourage development of more standardized solid waste management procedures, improved interagency coordination, and promulgation of guidelines in support there of.

6. Heighten citizen, commercial, and industrial awareness of the solid waste problem and their part in its effective and efficient management.

7. Identify local and regional interrelationships and effects of solid wastes, air, and water pollution, land use, growth and transportation. Promote policies which will enhance the environment of APEX.

8. Prepare and justify SWM Budget to EQA and Politicians.

CHAPTER 4

Annotated Worksheet

Chapter 4

ANNOTATED SOLID WASTE MANAGER WORKSHEET

The Solid Waste Manager Worksheet has five parts: (1) the Elite Opinion Poll, (2) the Budget Request, (3) the Budget Summary and Estimates, (4) Orders to Change Existing Systems, and (5) News Releases. This worksheet will serve as the official record of your agency. Space has been provided for you to record decisions over several years. At the end of each cycle, these decisions will be transferred to the computer.

I. ELITE OPINION POLL

Each year certain issues will appear in the METRO-APEX NEWS which require decisions from all role players, acting as the "elite" or power structure of the community. In some cases the decision of the elite is binding on the Politicians and the poll can be considered the same as submitting a referendum to the voters. Here the newspaper will read "DECIDED BY OPINION POLL MAJORITY." In other cases, the decision of the elite is merely advisory, and the Politicians can decide whether or not to heed their mandate. Here, the newspaper will read "POLITICIAN'S ULTIMATE DECISION BUT ELITE OPINION SOLICITED." (See the sample newspaper in Chapter 8 of this manual.)

The outcome of the vote will be recapitulated in the next cycle's newspaper. For each issue outcome, the newspaper will also print the reactions of five pressure groups--Civil Rights Groups, Effective Government Groups, Business Community, Labor Vote, Right-Wing Conservatives.

Players should vote on all issues in the Elite Opinion Poll, including those on the Business Page. Each role will have one vote. In the cases where there is more than one person in a role, an agreement must be reached.

The Elite Opinion Poll is especially important to the Politicians because their actions relative to the poll may affect their chances for reelection.

Instructions: Indicate the cycle number and your role at the top of the page. Then put the issue number in the left hand column (this should not be confused with a project number), and the number of the alternative chosen in the adjacent column.

Example:

Issue No.	Alternative
42	2
1	3

II. BUDGET REQUEST

A. Public Information and Education

Public Education is an integral and essential part of any public agency's program. Public Education typically covers cost associated with reports, technical meetings, news releases, conferences, and meetings with interested citizen's groups. The Solid Waste Manager's agency can develop public awareness through a good public education program, and the amount of resources expended will affect this awareness.

Instructions: Indicate the type of program in the left hand space and the requested funds in the right hand space. Then total the expenditures and enter in the Budget Summary under Item A.

Example:

A. Public Information and Education

Programs	Costs
television production	$4,000.
reports	$ 900.
"Clean Up APEX" campaign	$2,000.
telephone info. serv.	$ 500.
Total Public Information and Education	$ 7,400.

B. Administration and Enforcement

Administrative activities include many of the daily operating functions of an agency. For example, they would include functions associated with the preparation of the budget, personnel matters, planning, records storage and retrieval, etc. The costs under this section of the budget include the salary of the SWM and his staff, as well as the general cost of doing business, i.e., secretaries, supplies, office machines, services, accounting, etc.

Enforcement activities, on the other hand, are those associated with drafting legislation, bringing violators of regulations to trial, operation of a complaint file, building a court case, paying enforcement officers and inspectors to police unauthorized dumping, rodent control at disposal sites, etc.

Instructions: Indicate the type of program in the left hand column and the requested funds in the right hand column. Then total the administration expenditures and the enforcement expenditures and enter in the Budget Summary under Item B.

Example:

B. Administration and Enforcement

Administration

Programs	I	Costs
policy	I	$ 2,000
personnel	I	$20,000
supervision	I	$ 2,000
Total Administration		$24,000

Enforcement

Programs	I	Costs
vector control	I	$ 1,200
sanitation inspections	I	$ 2,500
complaints investigations	I	$ 1,000
unauthorized dumping	I	$ 2,000
Total Enforcement		$ 6,700

Total Administration and Enforcement $ 30,700.

C. Planning and Evaluation

This element of the SWM budget is concerned with the collection, analysis and interpretation of data and the development of alternative plans to deal with solid waste problems in APEX.

Instructions: Enter in the left column the programs you think would be necessary to pursue an organized solid waste management program in the areas of planning and evaluation. Under costs, estimate the cost of those programs, calculate the total cost of this budget item and enter in the Budget Summary under Item C.

Example:

C. Planning and Evaluation

Programs	Costs
data processing & analysis	$ 3,500
planning dept. liaison	$ 2,200
subcontract studies	$ 5,000

Total Planning and Evaluation $ 10,700

D. Soil Survey

Only a certain number of acres in any analysis area is suitable for sanitary land fill location because of varying soil conditions and the potential for ground water contamination. The Solid Waste Manager can determine the number of acres, if any, in a particular AA are suitable for a particular class of sanitary land fill by ordering a soil survey, and then comparing the results of this engineering study with the criteria table in Chapter 6.

Instructions: Indicate the number of the analysis area in which you desire a soil survey. List the AA's in order of priority. Multiply the number of AA soil surveys requested by $2,000 per survey and enter the total cost in the appropriate column and in the Budget Summary under Item D.

Example: Three soil surveys have been ordered in the example below. The soil surveys have been requested for analysis areas 2, 8 and 26--in that order of priority.

D. Soil Survey

Priority	1/	2/	3/	4/	5/	6/	7/	8/	9/	10/	11/	12/	# of AA's	Cost/ A.A.	Total Cost This Cycle
A.A.	2/	8/	26/	/	/	/	/	/	/	/	/	/	3	$2000	$6000

The data returned in the printout from these soil surveys is in the Annotated Printout, Chapter 8 of this manual. An example for AA 2 is:

A.A.	Water Table Level	Soil Type	Permeability Gal/Day/Sq.Ft.	Maximum Available Acres
2	30	sand	.002	230

The criteria for sanitary land fill location in Chapter 6 shows:

Sanitary Land Fill Class	Water Table Level	Soil Type	Maximum Soil Permeability
I	none	clay	.001
II	at least 15' below surface	sand	.005
III	at least 10' below surface	gravel	any

Therefore, AA 2 has 230 acres of land suitable for location of sanitary land fill classes II or III. It has no acres suitable for SLF Class I.

If the Solid Waste Manager thinks that a sanitary land fill, Class II in AA 2 is socially acceptable and economically advantagous compared to other locations, he would then encourage the Politicians to purchase the necessary land and order the appropriate capital project (SLF Class II, for instance). One cycle after the sanitary land fill project is purchased, the SWM may, with Politician approval, order the use of this fill as the designated disposal site for certain types of solid waste. (See Part IV of the worksheet).

E. Collection and Disposal Studies (Household refuse Type 2 only)

The following worksheet item on Collection and Disposal Studies will assist the SWM in determining collection/haul and disposal site location cost factors. Chapter 6 will provide him with further criteria on disposal site options for different types of solid waste.

The Solid Waste Manager may order studies to determine the capital investment and operating costs of various collection/haul and disposal system options. These studies are for Type 2,

household/commercial solid waste only since they relate to solid waste picked up on a regular route and schedule. Other types of solid waste are hauled to disposal sites by the generating agent. Comparison of these various systems costs with the existing system costs (See the Annotated Printout for current system summary) and by considering other criteria of acceptability, the SWM will be in the position to recommend to the Politicians and the public an optimum solid waste management system for APEX. An outline of criteria the Solid Waste Manager may wish to consider is in Chapter 6, Background Information for Solid Waste Managers Role.

The Solid Waste Manager may order collection and disposal studies to investigate the cost trade-offs resulting from the use of various collection and disposal parameters. These parameters are:

a. Ward from which solid waste is to be collected.
b. Possible use of a transfer station and AA location of the transfer station.
c. The location (AA) of the disposal site.
d. The type of disposal site.
e. Agency collecting the solid waste.
f. The specified location and container type that households and commercial establishments must use for regular refuse pickup.
g. The type of refuse collection trucks to be used.
h. The number of crew members per truck.

Instructions: From the list of parameters select those to be included in the study and enter in the appropriate columns under Studies Desired. Multiply the number of studies ordered by $10,000 per study and enter the total cost of the studies. Transfer the total cost obtained to the Budget Summary under Item E.

Example:

E. Collection & Disposal Studies
(Household Refuse-Type 2 only)

Parameters to chose from: Select only one from each of the different categories listed below for each Collection & Disposal Study.

(a) Refuse Collection From:
W-1 = Central City Ward 1
W-2 = Central City Ward 2
W-3 = Central City Ward 3
SUB = Suburb
TW-1 = Township 1
TW-2 = Township 2

(b) AA of Transfer Station:
(Optional)
A.A.'s 1-29

(c) AA of Disposal Site:
A.A.'s 1-29

(d) Disposal Site Type:
(final point of disposal)
1. INC = incinerator
2. O.D. = open dump
3. SLF1 = sanitary land fill class 1
4. SLF2 = sanitary land fill class 2
5. SLF3 = sanitary land fill class 3
6. TRAN = transfer station
7. CONT = contract

(e) Collection By:
CITY = City
CNTY = County
PRIV = Private

(f) Refuse Location:
1. BYB=backyard bag
2. BYC=backyard can
3. FYB=frontyard bag
4. FYC=frontyard can

(g) Truck Type:
Type 1=1.5 ton capacity
Type 2=4 ton capacity
Type 3=5 ton capacity

(h) Crew Size (Trucks):
1, 2 or 3 men

Study	Ward (a)	Solid Waste Type	AA of Trans (b)	AA of Disp. Site (c)	Disp. Site Type (d)	Col. By (e)	Ref. Loc. (f)	Truck Type (g)	Crew Size (h)
1	1	2	12	24	SLF2	City	BYB	1	2
2	1	2	--	26	SLF2	City	BYB	2	2

Number of Studies = 2 X $10,000/Study = Total Cost $ 20,000

For an example of the data provided by these collection and disposal studies see the Annotated Printout, Chapter 8.

F. Intergovernmental Coordination

In order to implement an effective solid waste management program, cooperation with other governmental agencies and departments whose policies influence solid waste generation and disposal is required. Most of the solid waste in APEX is generated within the City boundaries while most of the potential acceptable disposal sites are in the less populated County area. The State and Federal governments have various regulations (and funding programs) for the improvement of solid waste management systems. Decisions by the local and regional planners on land use and decisions by the Solid Waste Manager on optimum solid waste collection and disposal impact on each other should be coordinated. Most improvements in solid waste handling require expenditures by the Politicians, both City and County. Therefore, in order to establish an efficient and effective solid waste program in APEX, considerable coordination among these various governmental levels and their agencies is required. Information exchange, meetings, liaison, lobbying and other necessary interfaces require the expenditure of time and money to gain meaningful intergovernmental coordination.

Instructions: Enter the name of the required program and the yearly cost in the worksheet. Total the costs and enter in the Budget Summary under Item F.

Example:

F. Intergovernmental Coordination

Programs	I	Costs
state liaison	I	$ 2,200
quarterly prog. bulletin	I	$ 1,500
conf. & symposiums	I	$ 3,500

Total Intergovernmental Coordination $ 7,200

III. BUDGET SUMMARY AND BUDGET ESTIMATES

1. Budget Summary

Each year (cycle) a budget request for the cycle may also be prepared to allow for advanced planning. A projected budget for the next cycle, and a budget estimated for the following (3rd) cycle is prepared and submitted to the head of the Environmental Quality Agency. The EQA then submits a total budget for all other offices under his jurisdiction to the County Board of Supervisors. The Board then has three options: (1) to adopt a one, two, or three cycle budget without modification; (2) to revise the budget(s) before adoption; or (3) to reject entirely. If the budget proposal is modified, the functional budget must be rearranged to reflect the change. It is important to remember that programs will be cut to match funds allotted in the functional budget according to the priorities you have set within each functional category, i.e., soil surveys, collection and disposal studies, etc.

Each year the budget proposal must also be submitted to the Federal and State governments, if their assistance is requested.

Instructions: Complete the budget request items II-A through II-F as previously describer and transfer the totals from each of the functional categories to the corresponding headings of the Budget Summary, III-1A through 1F. Then allocate the appropriate portions of the total to the County and Federal governments. All budgets must be passed at a public hearing.

Example:

1. Budget Summary (Cycle N)	County	Federal	Total
A. Public Info. & Educ.	$ 2,400	$ 5,000	$ 7,400
B. Admin. & Enforce.	$19,700	$11,000	$30,700
C. Planning & Evaluation	$ 3,700	$ 7,000	$10,700
D. Soil Survey	$ 2,000	$ 4,000	$ 6,000
E. Collect & Disp. Stud.	$ 8,000	$12,000	$20,000
F. Intergov't. Coord.	$ 5,200	$ 2,000	$ 7,200
Total Budget Summary	$41,000	$41,000	$82,000

Signature of County Representative _____

Signature of Federal Representative _____

2. Federal Grant Application

Federal or State funds may be available to help local agencies in establishing and maintaining effective programs or in conducting demonstration programs. In order to receive funds, formal presentation must be made to the appropriate government representative in the game. (The Game Overall Director will see that you have access to this representative.) Funds are granted just prior to the cycle in which funds are to be used; however, you should lay the ground work several cycles before the need arises. If additional funds are needed during any year of a multiple year grant period, supplementary funds may be received by making an additional request to the Federal Representative in that year.

Instructions: On the first line fill in the original funds granted for the current cycle, the next cycle, and the cycle following that. Do the same on the next line for additional funds granted.

Example:

2. Federal Grant Application

	Cycle 1(N)	Cycle (N+1)	Cycle (N+2)
Original Funds Granted for Cycle	$41,000		
Additional Funds Granted for Cycle			
Total Funds	$41,000		

Signature of Federal Representative _____

3. Budget Estimates

For long-range planning purposes, an estimated budget for the second and third cycle (year) may be proposed. These budgets will also appear on the current cycle printout. This portion of the budget may be used for planning purposes or the EQA may get County and Federal approval for a two or three year period. If these budgets are filled out, they will appear in the cycle printout. If one or both are not filled out, they will not appear in the printout.

Instructions: Same as Budget Summary, Section III-1.

Example: Same as Budget Summary, Section III-1.

IV. ORDERS TO CHANGE EXISTING SYSTEMS

1. Changes Ordered in Existing Collection & Disposal Systems

The existing (cycle 1) collection and disposal systems with their operating parameters and costs, and the current disposal site summary with remaining capacities and dumping fee rate structures, are illustrated in the Annotated Printout in Chapter 8 of this manual.

After studying the existing systems and investigating the economies of alternative systems through Soil Surveys and Collection Disposal Studies (Item D and E above), the Solid Waste Manager may recommend, to the Politicians, the adoption of a change from current practices. If the Politicians approve of the change, purchase the desired capital projects, i.e., Sanitary Land Fill Class 2 in AA 26 and a new fleet of type 2 trucks, the SWM can order a "Change in Existing Collection and Disposal Systems." For Type 2 (household/commercial refuse) a system consists of collection truck type, crew size, refuse location for pickup, agency conducting the pickup, a transfer station (if desired) and the analysis area of the transfer station and disposal site. For Type 1 and 3 solid waste, the Solid Waste Manager may designate only the disposal method and its analysis area, i.e., disposal site type or disposal site type and transfer station. Pickup and haul for Type 1 and 3 solid waste are handled by the agency which generates the waste; an industry hauls its own Type 1 waste or the City Road Maintenance Department hauls its own Type 3 waste to the site designated by the SWM as appropriate sites for disposal of those wastes.

Instructions: Explain the desired change in collection, haul, transfer and disposal to the Politicians and justify the change. If they approve, make sure they put in the necessary capital projects (from their project list) into their worksheet. The SWM then fills out the "Change Ordered in Existing Collection and Disposal Systems" which assures that the solid waste is collected and disposed of as he orders. For Type 2 solid waste specify the new parameters for (a) through (h). For Type 1 and 3 solid waste the SWM may order only (a) through (d). Get the Politicians signature of approval on the worksheet.

Example:

1. Changes Ordered in Existing Collection & Disposal Systems

Ward (a)	SW Type (1,2or3) (a)	AA of Trans (b)	AA of Disp. Site (c)	Disp. Site Type (d)	Col. By (e)	Ref. Loc. (f)	Truck Type (g)	Crew Size (h)
1	2	0	26	SLF2	City	BYE	2	2

Signature of City Representative_____

Signature of County Representative_____

Required Capital Project Numbers / 124 / 128 / / /

2. Change in Disposal Site Fees

The current (cycle 1) fees charged to all parties who deposit solid waste at a particular disposal site are shown in the Annotated Printout, Chapter 8, under "Current Disposal Site Summary and Solid Waste Delivered Last Cycle From Each Ward." The fee rate charged at any disposal facility or transfer station may be changed by the Politicians for the publicly owned site. The procedes from these fees are credited to their operating budget. The operating costs per ton of solid waste handled at the site will be charged to their budget.

Instructions: Designate the location (owned by the County or City) of the disposal site, the analysis area of the site and the disposal site type. Enter the new per-ton fee to be charged for solid waste delivered to the site. Get the Politicians signature of approval.

Example:

2. Change in Disposal Site Fees

Location of Disp. Site (City or County)	AA of Disp. Site (c)	Disp. Site Type (d)	New Fee $/Ton
County	26	O.D.	0.75

Signature of City Representative _____

Signature of County Representative _____

V. NEWS RELEASE

Each cycle you should report your activities to the community. This is partially accomplished by making a news release on the news release forms.

Instructions: Develop and write a news release or publication. Present the news release to the representative of the News Media.

Example:

SWM News Release

This year the Solid Waste Manager has made a number of studies regarding the cost-effectiveness of collection and disposal in APEX County. Hopefully the results of this study will be incorporated into the Master Plan for APEX County.

CHAPTER 5

Worksheet

ELITE OPINION POLL

Role_____ Cycle Number_____

Issue No.	Alternative

Solid Waste Manager Cycle _____

II. BUDGET REQUEST

A. Public Information and Education

Programs	I	Costs
	I	
	I	
	I	
	I	
	I	

Total Public Information and Education $_____

B. Administration and Enforcement

Administration

Programs	I	Costs
	I	
	I	
	I	
	I	
	I	

Total Administration $_____

Enforcement

Programs	I	Costs
	I	
	I	
	I	
	I	
	I	

Total Enforcement $_____

Total Administration and Enforcement $_____

C. Planning and Evaluation

Programs	I	Costs
	I	
	I	
	I	
	I	
	I	

Total Planning and Evaluation $_____

Solid Waste Manager

D. Soil Survey

Priority A.A.*	1/	2/	3/	4/	5/	6/	7/	8/	9/10/11	# of AA's	Cost/ A.A. $2000	Total Cost this Cycle
	/	/	/	/	/	/	/	/	/			

E. Collection & Disposal Studies
(Household Refuse-Type 2 only)

Parameters to chose from: Select only one from each of the different categories listed below for each Collection & Disposal Study.

(a) Refuse Collection From:
W-1 = Central City Ward 1
W-2 = Central City Ward 2
W-3 = Central City Ward 3
SUB - Suburb
TW-1 = Township 1
TW-2 = Township 2

(b) AA of Transfer Station: (Optional)
A.A.'s 1-29

(c) AA of Disposal Site:
A.A.'s 1-29

(d) Disposal Site Type:
(final point of disposal)
1. INC = incinerator
2. O.D. = open dump
3. SLF1 = sanitary land fill class 1
4. SLF2 = sanitary land fill class 2
5. SLF3 = sanitary land fill class 3
6. TRAN = transfer station
7. CONT = contract

(e) Collection By:
CITY = City
CNTY = County
PRIV = Private

(f) Refuse Location:
1. BYB=backyard bag
2. BYC=backyard can
3. FYB=frontyard bag
4. FYC=frontyard can

(g) Truck Type:
Type 1=1.5 ton capacity
Type 2=4 ton capacity
Type 3=5 ton capacity

(h) Crew Size (Trucks):
1, 2 or 3 men

Study	Ward* (a)	Solid Waste Type*	AA of Trans* (b)	AA of Disp. Site* (c)	Disp. Site Type* (d)	Col. By* (e)	Ref. Loc.* (f)	Truck Type * (g)	Crew Size* (h)
1		2							
2		2							
3		2							
4		2							
5		2							
6		2							
7		2							
8		2							

Number of Studies = ___ X $10,000/Study = Total Cost $_____

Solid Waste Manager

F. Intergovernmental Coordination

Programs	Costs

Total Intergovernmental Coordination $_____

III. BUDGET SUMMARY AND BUDGET ESTIMATES
(From Budget Request Items A Thru F in the Worksheet)

1. Budget Summary (Cycle N)

	County*	Federal*	Total
A. Public Info. & Educ.			
B. Admin. & Enforce.			
C. Planning & Evaluation			
D. Soil Survey			
E. Collect & Disp. Stud.			
F. Intergov't. Coord.			
Total Budget Summary	$_____	$_____	$_____

Signature of County Representative_____

Signature of Federal Representative_____

2. Federal Grant Application

	Cycle__(N)	Cycle__(N+1)	Cycle__(N+2)
Original Funds Granted for Cycle			
Additional Funds Granted for Cycle*			
Total Funds			

Signature of Federal Representative_____

Solid Waste Manager

3. Budget Estimates for Cycle (N+1)

	County*	Federal*	Total
A. Public Info. & Educ.			
B. Admin. & Enforce.			
C. Planning & Evaluation			
D. Soil Survey			
E. Collect & Disp. Stud.			
F. Intergov't. Coord.			
Total Cycle (N+1) Est.	$	$	$

Budget Estimates for Cycle (N+2)

	County*	Federal*	Total
A. Public Info. & Educ.			
B. Admin. & Enforce.			
C. Planning & Evaluation			
D. Soil Survey			
E. Collect & Disp. Stud.			
F. Intergov't. Coord.			
Total Cycle (N+2) Est.	$	$	$

IV. ORDERS TO CHANGE EXISTING SYSTEMS

1. Changes Ordered in Existing Collection & Disposal Systems

Ward* (a)	SW Type (1,2or3)*	AA of Trans* (b)	AA of Disp. Site* (c)	Disp. Site Type* (d)	Col. By* (e)	Ref. Loc.* (f)	Truck Type* (g)	Crew Size* (h)

Signature of City Representative _____

Signature of County Representative _____

Required Capital Project Numbers / / / / / / /

2. Change in Disposal Site Fees

Location of Disp. Site* (City or County)	AA of Disp. Site* (c)	Disp. Site Type* (d)	New Fee $/Ton*

(NOTE: SIGNATURES REQUIRED--SEE NEXT PAGE)

Solid Waste Manager

Signature of City Representative _____

Signature of County Representative _____

THIS SPACE FOR ROLE ADVISOR USE ONLY

Cycle No. _____ _____
(Name of the submitting role)

NEWS RELEASE

The following is submitted to the
News Media for possible publication.

_____

_____

_____

_____

_____

_____

_____

_____

Editors Recommendation: PRINT _____ TELEVISE _____

INVESTIGATE FURTHER OR REWRITE _____

.....

Cycle No. _____ _____
(Name of the submitting role)

NEWS RELEASE

The following is submitted to the
News Media for possible publication.

_____

_____

_____

_____

_____

_____

_____

_____

Editors Recommendation: PRINT _____ TELEVISE _____

INVESTIGATE FURTHER OR REWRITE _____

CHAPTER 6

Background Information

Chapter 6

BACKGROUND INFORMATION FOR SOLID WASTE MANAGERS ROLE

The very important functions of public information and education, administration and enforcement, planning and evaluation and intergovernmental coordination are discussed in Chapter 3 and in Chapter 4, Annotated Worksheet. The following background information is provided to assist the SWM in understanding some of the technical options available in the routine business of disposing of solid waste in APEX County.

The Current System:

Current County and City solid waste collection and disposal systems just "evolved" over the years. A combination of decisions by prior Politicians, Planners, the Road Commission, the Public Health Department, and a lone Publics Works Director created the current inefficient collection and disposal system. Initially, solid waste generation was relatively small, and sparsely populated areas were available around the City for dump disposal. The generation of solid waste per capita is now growing year by year and the areas near the current dump sites are becoming more populated. The County and City are aware that they have a serious and pressing problem in finding new, economic and environmentally acceptable methods of solid waste management. The County has recently established the SWM as an arm of its Environmental Quality Agency, and both the City and County officials are beginning to realize that therein lies the only "in house" capability for studying the solid waste disposal problem and recommending viable solutions.

Data on the initial solid waste generation in APEX, the truck fleets which are now collecting Type 2 refuse, summaries of current collection and disposal systems and sites, and the operating parameters and costs are in Chapter 8--Annotated Printout.

Currently the Central City is collecting its municipal refuse primarily with small (12 cubic yard) two man trucks which have an average projected useful life of about three years. The trucks, when filled, deliver the refuse directly to either the City operated incinerator in AA 10 or to one of the County's two open burning dumps in AA 15 and 26. Current total Central City solid waste collection is 7.9 Pounds/Capita/Day or approximately 1,167,000 pounds/day. Of this total approximately 181 tons/day of Type 2 refuse from Ward 3 is hauled to the municipal incinerator in AA 10 which has a capacity of 200 tons/day. Of the remainder of Central City waste, 258 tons per day is hauled to an open dump in AA 15 and 380 tons per day to an open dump in AA 26.

County (non-City) refuse generation is currently running at 696,000 pounds/day. Collection is done under contract to a private refuse company which charges each household $5.00 per month for pickup. City residents taxes cover their collection charges. Township 1's disposal site is the County Dump in AA 26 and amounts to 152 tons/day. Approximately 336 tons/day of waste from Township 2 and the Suburb is hauled to AA 15. APCO has been complaining that the City either shut down its incinerator or install emission control systems to control particulate, SO2, CO, NOx, and HC emissions, which are in violation of regulations. Available emission controls cost from $240,000 to $620,000 to install and $70,000 to $100,000 per year to operate. Since these devices will control only particulate and not the other air pollutants, APCO has requested that the incinerator operation be terminated and no longer operate under a variance. After ignoring APCO's demands for several years that both open burning dumps cease burning, County officials have finally been ordered by the State to cease burning by the end of Cycle 2. Without the burning of dumped refuse, both dumps will probably be full to capacity by the end of Cycle 3. In the meantime, both open dumps constitute an environmental embarrasment to the County whose APCO is trying to get private industry to clean up its air pollution emissions. When burning is terminated, both dumps will become severe health hazards, and even more of a public nusiance. Adjacent property values may decline.

Current Solid Waste Generation by Type:

There are several major sources of solid waste being generated in the City and County of APEX. These include household and commercial refuse (excluding large solid fill materials such as demolition debris and other bulky refuse), solid fill materials, sludge (largely sewage sludge), non-hazardous industrial waste which varies from company to company, moderately hazardous wastes such as pesticides and industrial chemicals, toxic and biologically dangerous and radioactive hazardous wastes (which require special handling or storage) and agricultural wastes.

Agricultural wastes are largely burned at the site of generation or plowed under. Very little toxic or radioactive wastes is generated in APEX; as a result, neither of these two categories represent a significant contribution to the solid waste stream that requires routine collection and disposal. Therefore, in APEX, the solid waste will be consolidated into three categories, based on similarity of acceptable disposal methods.

Types of Waste to be Considered in APEX

Type	Description	Cycle 1 Gener. pounds/day	Cycle 1 Gen. %
1	Hazardous materials (including sludge, pesticides industrial chemicals, etc.	0.6	7.6
2	Household/commercial refuse	4.5	57.9
3	Solid Fill	2.8	35.4

Example of Solid Waste in Each Type:

S.W. TYPE 1 - Is composed of moderately hazardous waste such as industrial chemicals, municipal sludge and pesticides. "Special Hazardous Wastes" such as biologically dangerous and radioactive wastes are individually treated as special problems and are not included in this category.

S.W. TYPE 2 - Is household and commercial refuse including rubbish, garbage and decomposable organic refuse. Examples are:

a. empty tin cans
b. metals
c. paper and paper products
d. cloth and clothing
e. wood and wood products
f. lawn clippings, sod, and shrubbery
g. hair, hide, and bones
h. small dead animals
i. roofing paper and tar paper
j. unquenched ashes mixed with refuse
k. market refuse
l. garbage

S.W. TYPE 3 - Is composed of bulky non-water soluable, non-decomposable inert solids such as:

a. earth, rock, gravel, and concrete
b. asphalt paving fragments
c. glass
d. plaster and plaster board
e. manufactured rubber products
f. steel mill slag
g. clay and clay products
h. asbestos shingles

Allowable Disposed Options:

The current (Cycle 1) disposal of all Type 1, 2 and 3 solid waste in APEX is in either the open dump in AA 15, the open dump in AA 26 or in the municipal incinerator in AA 10. Other disposal options that the Solid Waste Manager may want to recommend are Sanitary Land Fills (Class I, II or III), Transfer Stations, or "Contract" to private collectors. The "Collection Disposal Systems Studies" conducted by the SWM will provide cost criteria for such recommendations.

Certain types of solid waste, because of the nature of the solid waste and because of potential ground water contamination, may only be disposed of in certain ways. The allowable disposal is as follows:

Disposal Site Limitations

Disposal Method	Solid Waste Type 1	2	3
INCIN.		X	
O.D.	X	X	X
SLF1	X	X	X
SLF2		X	X
SLF3			X
TRANSFER STATION		X	X

NOTE: "X" indicates allowable disposal options

Soil Survey--Acceptable Locations for Sanitary Land Fills:

Because of the varying soil conditions within APEX only a certain number of acres in any AA is suitable for sanitary land fill location. Because of the nature of the solid waste Types 1, 2 and 3, the water table level in a particular AA and the potential danger of ground water contamination, some types of sanitary land fills are not allowed in certain areas. The Solid Waste Manager can determine the suitability of any AA for a particular type of sanitary land fill by ordering a soil survey. The soil survey will provide data of water table level, soil type and soil permeability. That information and the table below will allow him to determine acceptable SLF locations.

Acceptable Criteria for Sanitary Land Fill Location

Sanitary Land Fill Class	Water Table Level	Soil Type	Max. Soil Permeability
I	none	clay	.001
II	at least 15' below surface	sand	.005
III	at least 10' below surface	gravel	any

NOTE: The number of acres of land in APEX suitable for Class I site is very limited. If these sites become full, the cost of hauling solid waste Type 1 out of the County may be high!

Collection and Disposal Studies:

The Solid Waste Manager will normally be interested in performing evaluations and trade-off studies on the feasibility and costs of alternate collection, haul and disposal of the solid wastes in APEX. His recommendations to the Politicians can provide them with an inexpensive and efficient system which does not produce other problems such as water pollution, air pollution or public nuisance.

Solid Waste Collection and Haul:

TYPE 1 solid waste (hazardous materials) and TYPE 3 solid waste (solid fill) are hauled to designated disposal sites by the municipal or County department or industry which generates the waste. For instance, Central City road maintenance crews which break up concrete streets and curbs and resurface the streets normally haul away the solid fill in their own trucks.

TYPE 2 solid waste (household/commercial refuse) is the only type of solid waste which is normally collected at the source on a regular periodic basis, i.e., household waste and grocery store waste is picked up weekly by collection trucks. Pickup of Type 2 refuse can be either by trucks and crews operated by the political jurisdiction or can be picked up by "contract" with private collectors.

The Central City currently (cycle 1) owns and operates a fleet of trucks to pick up this type of refuse in the City. The County pickup is being done under contract by private collectors. (It should be noted that even privately collected "Contract" solid waste of all three types are normally disposed of within the County of APEX and therefore must be considered in providing adequate disposal facilities.)

The type of pickup and haul system used by Ward 1, Ward 2 and Ward 3 of the Central City will be determined and funded by the City Politicians. A different system may be used for each Ward or the pickup systems may all be the same. The County Board of Supervisors similarly will determine the pickup and haul options for the jurisdictions under their control.

If the Politicians (City or County) decide (usually upon the recommendation of the Solid Waste Manager) to purchase their own fleet of trucks and hire personnel to collect Type 2 refuse, the following options are available.

(a) Refuse Collection From:

Designation of the ward to which the pickup options will apply.

(b) The Analysis Area of a Transfer Station (if one is desired):

Transfer stations are optional, in that the solid waste may be hauled directly to the final disposal site by the collecting trucks or to a transfer station.

(c) Designation of the Analysis Area of the Disposal Site.

(d) Disposal Site Type:

On a pickup route the refuse trucks, when full, may be designated to haul to a particular disposal site type in a particular analysis area or to a transfer station (if one exists). Refuse delivered to a transfer station will then be hauled to the final disposal site by large capacity trucks in which the station equipment has compacted the refuse. A fee is normally charged by the transfer station for all solid waste delivered. House to house pickup and haul crews normally work an 8 hour day and a 5 day week. If the existing collection fleet and crews cannot collect all of the Type 2 refuse generated in a particular ward under this schedule, they will continue to work overtime (at additional overtime pay) until all refuse is collected.

NOTE: Limitations are (a) all of refuse from one ward must be collected with one system, i.e., BYB, Truck Type 2, Crew Size 1, and (b) all of refuse from one ward must go to a transfer station or one disposal site or through a combination of the two.

(e) Collection By:

Designation can be made for collection by equipment owned and operated by (1) the City, (2) the County, or (3) Private Collectors.

(f) Refuse Location:

The pickup of household refuse can be designated as:
BYB = Backyard bags (no particular size or type)
BYC = Backyard cans (regular standard refuse cans)
FYB = Frontyard bags (no particular size or type)
FYC = Frontyard cans (regular standard refuse cans)

(g) Truck Type:

There are three truck types available for collection studies:

TRUCK TYPE	CAPACITY	INITIAL COST
1	1.5 ton	(See Project List)
2	4.0 ton	(See Project List)
3	5.0 ton	(See Project List)

(Note: Project lists are available through the Planners or Politicians.)

(h) Crew Size:

Any truck type can be operated with a 1, 2 or 3 man crew.

The collection and disposal studies are one of the major tools used by the Solid Waste Manager to compare the costs of the existing systems with alternative systems. The studies cost $10,000 each and the SWM will want to budget for sufficient studies to attempt to determine a reasonably acceptable waste disposal system at moderate costs. In addition to cost, however, there are several other important criteria he probably will want to consider.

The minimum criteria he would normally include is:

1. Collection/Haul and Disposal Costs
   a. Capital Costs (truck costs, land costs, etc.)
   b. Operating Costs (yearly equipment and labor costs)

2. Type and Location of Disposal Sites Based ON:
   a. Planners approval on coordination with the Master Plan and land use criteria for APEX County
   b. Public acceptability
   c. Politicians approval based on their interpretation of their constituents needs and desires.
   d. Overall environmental considerations and impacts on air, water and recreational quality.
   e. Adaptability to resource recovery systems, including refuse separation, recycling, use of waste for heat generation, etc.

Changing the Existing System to a New System:

If the Solid Waste Manager decides that one of the alternative solid waste systems he has studied should be substituted for the existing system he must assure the accomplishment of several objectives to effect the change.

1. Explain the advantages of the new system and convince the Politicians to implement it.

2. If the new system requires a new collection truck fleet or a change to a different truck type, see that the Politicians who have jurisdiction in the collection area (Ward) purchase the new truck fleet by putting in their worksheet the appropriate capital project. The project may need to be put in more than once to purchase sufficient trucks. The Politicians budget will be credited with the trade-in value of the old truck fleet.

3. If the new system requires a new disposal site or transfer station, see that the Politicians who have jurisdiction over the area (ward) in which the disposal or transfer station is to be located put in the appropriate capital project.

4. The SWM should complete his worksheet Section III, "Changes Ordered in Existing Collection and Disposal System", and get the approval signatures of the Politicians.

Change in Disposal Site Fees:

All parties who deposit solid waste at a transfer station or disposal site are charged a fee. The fee is set by the Politicians who own the site and all revenues generated represent income into the Politicians operating budget.

The Politicians operating budget, however, will be charged for the costs incurred in operating a transfer station or disposal site. These costs represent the cost of operating equipment and personnel salaries at the site.

If the fees per ton charged is greater than the operating cost per ton, the Politicians will receive a net income in his operating budget from the operation of the site. The Solid Waste Manager will find the current fee charged per ton and the operating cost per ton in his printout. (See Chapter 8, Annotated Printout.)

CHAPTER 7

References

Chapter 7

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CHAPTER 8

Annotated Printout

The following pages represent the annotated printout for the Solid Waste Manager. The decisions are representative of the types of decisions that the Solid Waste Manager could make. Some of the rationale for making these decisions are explained in Chapter 4 of this manual.

	FUNDS SPENT IN CYCLE 1 COUNTY	FEDERAL	TOTAL
A. PUBLIC INFORMATION & EDUCATION	2400.	5000.	7400.
B. ADMINISTRATION & MANAGEMENT	19700.	11000.	30700.
C. PLANNING & EVALUATION	3700.	7000.	10700.
D. SOLID WASTE	2000.	4000.	6000.
E. COLLECTION & DISPOSAL STUDIES	9000.	17000.	26000.
F. INTERGOVERNMENTAL COORDINATION	5200.	2000.	7200.
** TOTAL	41000.	41000.	82000.

a

FEDERAL FUNDS AVAILABLE ON A 3:2 TO 1:1 BASIS FOR NEXT TWO CYCLES CYCLE 2 $ 0.

CYCLE 3 $ 0. b

TOTAL FOR TWO YEARS $ 0.

c

d

a NOTES ON FUNDING CUTS

b TOTAL FUNDS ALLOCATED TO EACH CATEGORY MUST BE SUFFICIENT TO COVER ALL BUDGET REQUESTS OR ALLOCATION WILL BE AUTOMATICALLY CUT-BACK

c FUTURE FEDERAL GRANTS WILL APPEAR HERE, IF APPROPRIATED

d FUNDS NOT SPENT WILL BE RETURNED TO EITHER THE COUNTY OR FEDERAL GOVERNMENTS

D. SOIL SURVEY

A	e WATER TABLE LEVEL(FT)	f SOIL TYPE	g PERMEABILITY GAL/DAY/SQFT	h MAXIMUM AVAILABLE ACRES
7	10	SAND	0.002	230.
8	11	GRVL	0.005	50.
26	20	SAND	0.004	200.

e THIS IS A SUMMARY OF THE SOIL SURVEYS ORDERED FOR THIS CYCLE. THIS SUMMARY USED IN CONJUNCTION WITH THE TABLE FOUND IN CHAPTER 6 OF THE MANUAL WILL QUICKLY TELL THE SWM WHICH AA'S ARE BEST SUITED FOR A PARTICULAR LANDFILL CLASS. THE COST OF SURVEYING ONE AA IS $2000.

f THERE ARE 3 SOIL TYPES -- SAND, CLAY, & GRAVEL

g THIS IS A RATE AT WHICH THE SOIL WILL ASBORD WATER

h THESE ARE THE NUMBER OF ACRES WHICH ARE AVAILABLE FOR PURCHASE BY THE POLITICIANS TO BUILD A PARTICULAR LANDFILL

METRO-APEX -- 6/30/74 -- SOLID WASTE MANAGEMENT -- CYCLE 1, PAGE 24
ANNOTATED PRINTOUT FOR CHAPTER 8 TCAY 1

F. COLLECTION AND DISPOSAL STUDY (HOUSEHOLD REFUSE TYPE-2)

j k l m n o p

STUDY	CARD	DIST. LOC.	TRUCK TYPE	TRUCK NO.	CREW SIZE	SIZE TOTAL	TRANS AA	DISPOSAL SITE	DISPOSAL AA	TONS S.W.	OPERATING COSTS: PICKUP-HAUL LABOR	PICKUP-HAUL TRUCK	TRANSFER STATION	DISPOSAL SITE	TOTAL
1	1	HY1	1	R	2	10.	12	SLF2	24	36097.	133187.	66706.	42510.	18040.	260551.
PER TON PARAMETERS --			3.20 TONS/M.H.					COSTS/TON --			3.69	1.85	1.18	0.50	7.22
COLLECTION TIME 3.000 MIN./M.H.															

STUDY	CARD	DIST. LOC.	TRUCK TYPE	TRUCK NO.	CREW SIZE	SIZE TOTAL	TRANS AA	DISPOSAL SITE	DISPOSAL AA	TONS S.W.	OPERATING COSTS: PICKUP-HAUL LABOR	PICKUP-HAUL TRUCK	TRANSFER STATION	DISPOSAL SITE	TOTAL
3	1	HY1	1	S	2	10.	0	SLF2	24	36097.	83242.	40793.	0.	18049.	142083.
PER TON PARAMETERS --			3.20 TONS/M.H.					COSTS/TON --			2.31	1.13	0.0	0.50	3.94
COLLECTION TIME 3.000 MIN./M.H.															

THE FOLLOWING ARE THE PARAMETERS THE SWM CAN SELECT. BASED UPON THOSE PARAMETERS AND THE TOTAL SOLID WASTE IN THAT WARD THE NON-LETTERED VALUES ARE CALCULATED. THESE ARE ONLY STUDIES AND SHOULD BE COMPARED TO EXISTING SYSTEMS.

i WARD
1=CENTRAL CITY WARD 1 AA'S 1-4
2=CENTRAL CITY WARD 2 AA'S 5-8
3=CENTRAL CITY WARD 3 AA'S 9-13
4=SUBURB AA'S 17-19
5=TOWNSHIP 1 AA'S 23-28
6=TOWNSHIP 2 AA'S 14-16, 20-22, 29

k REFUSE LOCATION
BYB-BACKYARD BAG
BYC-BACKYARD CAN
FYB-FRONTYARD BAG
FYC-FRONTYARD CAN

l TRUCK TYPE
1, 2, or 3

m CREW NUMBER
1, 2, or 3 man/truck

n AA OF TRANSFER STATION
1-29

o DISPOSAL SITES
INC-INCINERATOR
O.D.-OPEN DUMP
SLF1-SANITARY LANDFILL CLASS 1
SLF2-SANITARY LANDFILL CLASS 2
SLF3-SANITARY LANDFILL CLASS 3
TRAN-TRANSFER STATION
CONT-CONTACT

p DISPOSAL SITE
1-29

METRO-APEX -- 6/30/74 -- GENERAL SUMMARY INFORMATION -- CYCLE 1. PAGE 25
ANNOTATED PRINTOUT FOR CHAPTER 8 YEAR 1

1. GENERATION OF SOLID WASTE (TONS/YEAR) q

S.W. TYPE	1	2	3	TOTAL	%
R-1	4803.	36097.	22450.	63350.	18.9
R-2	5019.	37717.	23458.	66194.	19.7
R-3	6198.	46375.	28967.	81740.	24.4
SUB	2726.	20487.	12741.	35954.	10.7
TW1	2874.	21599.	13433.	37906.	11.3
TW2	3431.	28792.	17907.	49810.	15.1
TOTALS	25451.	191268.	118355.	335074.	100.0

2. GARBAGE TRUCKS r

	TYPE	NUMBER	TRADE IN VALUE
R-1	1	20	$ 64000.
R-2	1	20	$ 64000.
R-3	2	10	$ 96000.
SUB	0	0	$ 0.
TW1	0	0	$ 0.
TW2	0	0	$ 0.

3. COLLECTION/DISPOSAL SYSTEMS w

SOURCE	SW TYPE	PICKUP BY	REF. LOC.	TRUCK TYPE	TRUCK NO	CREW SIZE NO	CREW SIZE TOTAL	COL. TIME PER HH (MIN)	TRAN AA	DISPOSAL SITE	DISPOSAL AA	TOTAL TONS S.W.	$ OPERATING COSTS $ PICKUP-HAUL LABOR	PICKUP-HAUL TRUCK	TRANSFER STATION	DISPOSAL SITE
R-1	2	CITY	UYB	1	20	2	40	0.600	0	O.D.	26	36097.	194822.	66228.	0.	14419.
PER TON PARAMETERS --		3.20 TONS/H.H.								COSTS/TON --			5.40	1.83	0.0	0.40

SOURCE	SW TYPE	PICKUP BY	REF. LOC.	TRUCK TYPE	TRUCK NO	CREW SIZE NO	CREW SIZE TOTAL	COL. TIME PER HH (MIN)	TRAN AA	DISPOSAL SITE	DISPOSAL AA	TOTAL TONS S.W.	$ OPERATING COSTS $ PICKUP-HAUL LABOR	PICKUP-HAUL TRUCK	TRANSFER STATION	DISPOSAL SITE
R-2	2	CITY	UYB	1	20	2	40	0.600	0	O.D.	15	37717.	195608.	66426.	0.	15087.
PER TON PARAMETERS --		3.20 TONS/H.H.								COSTS/TON --			5.19	1.76	0.0	0.40

SOURCE	SW TYPE	PICKUP BY	REF. LOC.	TRUCK TYPE	TRUCK NO	CREW SIZE NO	CREW SIZE TOTAL	COL. TIME PER HH (MIN)	TRAN AA	DISPOSAL SITE	DISPOSAL AA	TOTAL TONS S.W.	$ OPERATING COSTS $ PICKUP-HAUL LABOR	PICKUP-HAUL TRUCK	TRANSFER STATION	DISPOSAL SITE
R-3	2	CITY	UYB	2	10	2	20	0.630	0	INC.	10	46575.	111711.	40033.	0.	256165.
PER TON PARAMETERS --		3.20 TONS/H.H.								COSTS/TON --			2.40	0.86	0.0	5.50

SOURCE	SW TYPE	PICKUP BY	REF. LOC.	TRUCK TYPE	TRUCK NO	CREW SIZE NO	CREW SIZE TOTAL	COL. TIME PER HH (MIN)	TRAN AA	DISPOSAL SITE	DISPOSAL AA	TOTAL TONS S.W.	$ OPERATING COSTS $ PICKUP-HAUL LABOR	PICKUP-HAUL TRUCK	TRANSFER STATION	DISPOSAL SITE
SUB	2	PRIV							0	O.D.	15	20487.	0.	0.	0.	8195.

q THIS IS A SUMMARY OF ALL THE SOLID WASTE GENERATED IN APEX LAST CYCLE.

r THIS IS A SUMMARY OF THE SOLID WASTE COLLECTION TRUCK FLEETS OWNED BY THE CITY AND COUNTY. ONLY TYPE 2 (HOUSEHOLD REFUSE) IS COLLECTED BY THE TRUCK FLEETS. TYPE 1 AND TYPE 3 SOLID WASTE ARE DELIVERED TO THE DISPOSAL SITE IN VEHICLES OWNED BY THE GENERATING SOURCE IE., STREET MAINTENANCE TRUCKS OR INDUSTRY OWNED TRUCKS. THERE CAN ONLY BE ONE TRUCK TYPE IN A GIVEN WARD. IF THE POLITICIANS WANT TO CHANGE TO A NEW TYPE OF TRUCK FLEET IN A GIVEN WARD THEY WILL RECEIVE A TRADE-IN VALUE FOR THE EXISTING FLEET. EACH YEAR THE TRUCKS WILL DEPRECIATE IN VALUE.

S THE AMOUNT OF SOLID WASTE GENERATED IN EACH WARD IS SHOWN BY EACH TYPE OF SOLID WASTE.

TYPE 1 - HAZARDOUS MATERIALS
TYPE 2 - HOUSEHOLD/COMMERCIAL REFUSE
TYPE 3 - SOLID FILL

t THE TOTALS OF EACH TYPE OF SOLID WASTE GENERATED IN APEX AND THE TOTAL BY WARD IS LISTED. THE GRAND TOTAL OF ALL SOLID WASTE GENERATED IN APEX LAST CYCLE IS SHOWN.

U THE PERCENT OF THE TOTAL APEX SOLID WASTE IS SHOWN FOR EACH WARD.

V THE TRUCK TYPE OWNED BY THE CITY COLLECTING TYPE 2 SOLID WASTE IN EACH WARD IS SHOWN. THE SOLID WASTE IN THE COUNTY (SUBURB, TOWNSHIP 1 and TOWNSHIP 2) IS CURRENTLY COLLECTED BY PRIVATE CONTRACTORS AND THEREFORE NO TRUCKS. NUMBER OF TRUCKS IN FLEET AND REMAINING TRADE IN VALUE OF FLEET IS LISTED.

W THIS PAGE GIVES THE DETAILS OF THE CURRENT SYSTEM OF SOLID WASTE COLLECTION, HAUL AND DISPOSAL COSTS ON A WARD BY WARD BASIS FOR EACH SOLID WASTE TYPE.

X TYPE 1 - HAZARDOUS MATERIALS
TYPE 2 - HOUSEHOLD/COMMERCIAL REFUSE
TYPE 3 - SOLID FILL

y DETAILS OF THE CURRENT COLLECTION SYSTEM ARE SPECIFIED TO THE POLITICIANS OF THAT JURISDICTION AND THEY MUST PAY THE CAPITAL COST OF THE TRUCK FLEET AND THE YEARLY OPERATING COSTS. IF THE HOUSEHOLD REFUSE IS COLLECTED BY A PRIVATE CONTRACTOR WHO IS PAID BY THE INDIVIDUAL HOUSEHOLDER NO COLLECTION DATA IS GIVEN. THE POLITICIANS HOWEVER, THROUGH THE SWM MAY STILL SPECIFY THE DISPOSAL SITE TO WHICH THE PRIVATE COLLECTOR MUST HAUL THE REFUSE.

Z THE POLITICIANS MAY SET THE "DUMPING FEE" AT THE DISPOSAL SITE. THE FEE PER TON MAY BE DIFFERENT THAN THE SITE OPERATING COSTS PER TON.

a A ZERO INDICATES NO TRANSFER STATION. IF A TRANSFER STATION IS IN OPERATION, THE ANALYSIS AREA (AA) OF THE STATION WILL BE LISTED.

b THE GENERATION PER CYCLE PER HOUSEHOLD AND THE SYSTEM OPERATING COSTS PER TON ARE GIVEN FOR EACH WARD. THESE ARE USEFUL FOR COMPARING THE EXISTING SYSTEM COSTS WITH THE PROJECTED COSTS OF ALTERNATE SYSTEMS WHICH ARE OBTAINED IN A COLLECTION/DISPOSAL SYSTEM STUDY.

TWP 3 DRIV W 0 0. 15. 17907. 0. 0. 0. 7163.

4. DISPOSAL SITES

SITE	d AA	c W-1	W-2	W-3	e SUM	TAI	TWP	f TOTAL TONS/YEAR	g REMAINING CAPACITY TONS OR RATE		h CHARGE PER TON
DOD.	20	43750.	0.	75164.	0.	37906.	0.	136421.	38358.	$	0.40
DOD.	19	0.	60194.	0.	35954.	0.	60330.	152670.	36732.	$	0.40
INC.	10	0.	0.	46575.	0.	0.	0.	46575.	200.	$	5.50

c THIS TABLE SUMMARIZES THE EXISTING DISPOSAL SITES.

d THE ANALYSIS AREA OF THE SITE IS GIVEN.

e THE ANNUAL TONNAGE OF SOLID WASTE FROM EACH WARD SENT TO EACH OF THE EXISTING SITES IS GIVEN.

f THE TOTAL TONNAGE OF SOLID WASTE SENT TO EACH DISPOSAL SITE LAST CYCLE IS SHOWN.

g THE REMAINING CAPACITY OF THE DISPOSAL SITE BEFORE IS BECOMES FULL IS GIVEN. IF A SITE IS FILLED AND SOLID WASTE IS STILL DELIVERED TO IT, THE SOLID WASTE WILL BE HAULED OUT OF THE COUNTY UNDER A "CONTRACT RATE" CHARGE. AN INCINERATOR OR TRANSFER STATION WILL HAVE A YEARLY MAXIMUM HANDLING RATE INSTEAD OF A "FILL UP" CAPACITY.

h LISTED HERE ARE THE FEE CHARGES PER TON OF SOLID WASTE DELIVERED TO A PARTICULAR SITE. THIS FEE MAY BE CHANGED BY THE POLITICIAN.

The following pages include the METRO-APEX NEWS which will give you a basis regarding some of the decisions made for Cycle 1. It will also provide you with a history of some of the problems in APEX County.

a

METRO-NEWS

TEAM 1, EDITION 1 | SUNDAY, JUNE 30, 1974 | ANNOTATED PRINTOUT FOR CHAPTER 8

NATIONAL NEWS HEADLINES b

AUTOMOBILE PRODUCTION RECOVERS FROM SLUMP, HIGHEST SALES IN HISTORY PREDICTED.

SINGLE REAL ESTATE DEVELOPER SPEAKS IN FAVOR OF OPEN HOUSING AT CONGRESSIONAL COMMITTEE MEETING--OTHERS NEGATIVE.

U. S. CENSUS BUREAU ISSUES REPORT STATING THAT NET ANNUAL ADDITIONS TO THE HOUSING STOCK HAVE DECLINED TO 600,000 UNITS LEAVING A GAP OF 250,000 BETWEEN NEW UNITS ADDED AND NET NEW FAMILY FORMATIONS. CENTRAL CITY HOUSING SITUATION CRITICAL. c

DEFENSE SPENDING IS AGAIN AT AN ALL TIME HIGH-AS CONGRESSIONAL CRITICS WARN OF GUNS VS. BUTTER CONFLICT.

U. S. UNEMPLOYMENT RATE FOR PAST YEAR WAS 4.1 PERCENT

STATE NEWS HEADLINES b

[illegible] MARCH ON THE STATE CAPITOL INFURIATES LAWMAKERS WHO SAY THEY WON'T BOW TO PRESSURE GROUP TACTICS.

STATE [illegible] PLANS TO WORK WITH COUNTY HEALTH UNITS TO CRACK DOWN ON UNSAFE SEPTIC TANKS IN RURAL [illegible] INSPECTIONS AREA IN THE STATE. OLD SEPTIC TANKS AND INADEQUATE WATER SYSTEMS MAKE SUB-DIVISION DEVELOPMENTS DANGEROUS.

EDUCATORS PRESS STATE FOR GREATER AID TO LOCAL SCHOOL DISTRICTS, ARGUING WE ARE FALLING BEHIND THE NATIONAL LEADERS.

APPROXIMATELY [illegible] OF THE WORST MIDDLE-SIZED CITIES WHO HAVE LET CAPITAL PLANT INVESTMENTS IN THE DOWNTOWN DETERIORATE. c

DEMOCRAT-REPUBLICAN DEADLOCK IN STATE SENATE IS BROKEN AS GOVERNOR INTERVENES TO FORCE AN EDUCATION-WELFARE PACKAGE.

WELFARE MOTHERS IN TEN COUNTIES SIT IN TO PROTEST LOW ALLOCATIONS FROM STATE AND COUNTIES. TAXPAYER ANGER OVER DEMONSTRATIONS IN STATE IS GROWING, MAKING INCREASED STATE WELFARE PAYMENTS UNLIKELY THIS YEAR.

LOCAL NEWS ITEMS b

a THE METRO-APEX NEWS IS PUBLISHED EACH CYCLE AND IS A PRIME SOURCE OF INFORMATION ABOUT CURRENT PROBLEMS AND EVENTS AND THEIR IMPACT ON APEX COUNTY.

b THE METRO-APEX NEWS FEATURES NATIONAL NEWS HEADLINES, STATE NEWS HEADLINES AND LOCAL NEWS ITEMS. THE "LOCAL NEWS ITEMS" ARE PRESENTED UNDER SUB-HEADINGS OF METROPOLITAN AND COUNTY, CENTRAL CITY, SUBURB, TOWNSHIP 1, TOWNSHIP 2, AND BUSINESS PAGE.

c NATIONAL AND STATE NEWS REFLECTS THE GENERAL STATE OF THE ECONOMY AND NEW GOVERNMENTAL POLICIES WHICH MAY IMPACT ON VARIOUS SEGMENTS OF THE APEX COMMUNITY.

d EACH YEAR CERTAIN ISSUES WILL APPEAR IN THE METRO-APEX NEWS WHICH REQUIRE DECISIONS FROM ALL ROLE PLAYERS. EACH ISSUE IS IDENTIFIED BY AN ISSUE NUMBER. THE ISSUES CONSIST OF A STATEMENT OF THE ISSUE AND SEVERAL PROPOSED ALTERNATIVE ACTIONS. EACH PLAYER SHOULD CHOOSE THE ALTERNATIVES HE FAVORS AND FILL OUT THE ELITE OPINION POLL OF HIS WORKSHEET.

e SOME ALTERNATIVES PROPOSE THE IMPLEMENTATION OF SPECIFIC PROJECTS. PROJECT NUMBERS SHOULD NOT BE CONFUSED WITH ISSUE NUMBERS.

f LOCAL NEWS ITEMS ARE IDENTIFIED BY THE ANALYSIS AREA IN WHICH THEY ORIGINATED.

g THE BUSINESS PAGE LISTS EXOFIRMS WHICH WOULD LIKE TO LOCATE IN APEX. THE FIRM WILL NORMALLY NOT LOCATE IN APEX UNLESS THE SPECIFIED CONDITIONS ARE MET.

h THE LOCATIONS PREFERED BY THE EXOFIRM ARE LISTED IN ORDER OF PREFERENCE, IE., AA 10 IS THE FIRST PREFERRENCE, AA 25, SECOND CHOICE, ETC.

METROPOLITAN AND COUNTY b

RUNWAY EXPANSION NEEDED FOR AMFA AIRPORT. COST SLT AT $350,000. PROJECT NO. 109. e

....PRECEDING IS ISSUE 4 d POLITICIAN'S ULTIMATE DECISION BUT ELITE OPINION SOLICITED

---- ALTERNATIVE 1 FAVOR RUNWAY PROJECT 109

---- ALTERNATIVE 2 POSTPONE AND RECONSIDER e

---- ALTERNATIVE 3 OPPOSE RUNWAY PROJECT 109

COUNTY ROAD COMMISSIONER REPORTS THAT NOISE AND CONCRETE DUST FROM ASPHALT COMPANY WILL CAUSE AN INCREASE IN COSTS OF HIGHWAY CONSTRUCTION IN THE AREA. THIS MAY BE A DEVELOPMENT WHICH COULD ULTIMATELY MEAN HIGHER TAXES STATEWIDE.

STATE INSPECTOR LIKENS DUST PROBLEM FROM DUSTY ROADS CEMENT PLANT HAS-FILLING OPERATION TO CAUSES OF SILICOSIS IN MINING OPERATIONS.

STATE LEGISLATURE ENACTS BAN ON ALL OPEN BURNING DUMPS. AMFA SOLID WASTE MANAGER FACES MOUNTING PROBLEMS -- INADEQUATE INCINERATION, ROUTING AMOUNTS OF WASTE, PUBLIC DISTRUST OF LANDFILLS, AND OUTDATED COLLECTION EQUIPMENT. AMFA MAY BE FORCED IN TO CAN TRASH.

AA 3 - f
OLD TIME RESIDENT CLAIMS, "THIS SMATTER POLLUTION IS GETTING WORSE EVERY YEAR. DONT KNOW HOW LONG I CAN HOLD OUT.

AA 4 -
INDUSTRY GROUP BLAMES HOMEOWNER BACKYARD BURNING AS PRIME CAUSE OF AMFA SMOG.

AA 5 -
SMOKE HAZE INCREASES HAZARDS OF AIRCRAFT LANDING. PILOT TELLS AMFA KIWANIS.

CENTRAL CITY b

PLANS COMPLETED FOR NEW CITY HALL. FUNDING SOUGHT. A $1.2 MILLION BOND ISSUE IS PROPOSED TO FUND A MODERN, EFFICIENT, WELL-DESIGNED CITY HALL TO REPLACE PRESENT 80-YEAR-OLD BUILDING IN AA 6. GENERAL SUPPORT OR COMMUNITY LEADERS IS ASKED FOR THIS LONG-OVERDUE IMPROVEMENT (PROJECT 86).

....PRECEDING IS ISSUE 1 POLITICIAN'S ULTIMATE DECISION BUT ELITE OPINION SOLICITED

---- ALTERNATIVE 1 FAVOR PROJECT 86

---- ALTERNATIVE 2 POSTPONE AND RECONSIDER

---- ALTERNATIVE 3 OPPOSE PROJECT 86

SUMMER DAY CAMPS PROPOSED FOR DISADVANTAGED YOUTH. STATE FUNDS, WITH CHARITY CONTRIBUTIONS, MAKE $160,000 AVAILABLE, PROVIDED CITY CAN COME UP WITH $120,000. PROGRAM NO. 10.

ANNEXATION OF MAPLE GROVE AREA (AA 12) TO GO TO A VOTE. FAVORED BY CHAMBER OF COMMERCE DUE TO POSSIBLE INDUSTRIAL SITES AT FREEWAY INTERCHANGE. THE ANNEXATION OF THIS AREA IS ALSO OPPOSED BY ANTI-TAX GROUPS BECAUSE OF THE COST OF PUBLIC IMPROVEMENTS REQUIRED. SCHOOL DISTRICT ANNEXATION TIED TO CITY VOTE - BOTH MUST BE APPROVED TOGETHER.

....PRECEDING IS ISSUE SC DECIDED BY OPINION POLL MAJORITY AND REFERENDUM

---- ALTERNATIVE 1 FAVOR ANNEXATION OF AA 12

---- ALTERNATIVE 2 AVOID THE ISSUE

---- ALTERNATIVE 3 OPPOSE THE ANNEXATION

COMMUTERS REPORT IMPAIRMENT OF SENSE OF SMELL AFTER WEEK'S TRAVEL PAST TROJAN VARNISH COMPANY IN ANALYSIS AREA 10. DANNY DINKS, WHO PASSES THE PLANT FOUR TIMES DAILY, COMPLAINS HE CAN'T SMELL HIS GIRL'S PERFUME ANYMORE.

AA 4 -
RESIDENTS PRESS DEMANDS FOR SMALL CITY PARKING LOT AS LOCAL PARKING PROBLEMS MOUNT AND DOUBLE-PARKING CREATES SNARLS.

AA 9 -
HUGE CRACKS IN LOCAL STREETS CAUSE MAJOR ACCIDENT AS DELIVERY TRUCK SPINS OUT OF CONTROL. IMMEDIATE RESURFACING A "MUST"

AA 3 -
SPEEDING TRAFFIC LOAD CITED. INSPECTOR MUGGERIDGE SAYS STREET WIDENING MUST BEGIN "BEFORE IT'S TOO LATE."

AA 4 -
OVERLOADING OF AGED SEWER LINES BRINGS DEMANDS FOR IMMEDIATE EXPANSION OF SANITARY SEWER CAPACITY.

AA 8 -
STORM CAUSES BASEMENT FLOODING IN SEVERAL-BLOCK AREA AS STORM SEWERS OVERFLOW. ACTION DEMANDED NOW TO EXPAND CAPACITY.

AA 3 -
RECORD RAINFALL FLOODS AREA. EXPANSION OF LOCAL STORM SEWER SYSTEM NEEDED.

AA 4 -
WATER PRESSURE DEPLETED BY RAPIDLY-INCREASING USE. MAY HAMPER FIRE-FIGHTING EFFORTS UNLESS WATER MAINS ARE EXPANDED SOON.

AA 3 -
WATER MAIN EXPANSION NECESSARY TO MAINTAIN WATER PRESSURE BRIGHTLY LIGHTED BY INCREASED USE OF AIR CONDITIONING.

AA 6 -
WATER MAINS BURST [illegible] TIMES IN TWO MONTHS. RESIDENTS, UNDERSTANDABLY IRRITATED, DEMAND "LASTING" MAJOR REPAIRS.

AA 4 -
"PARKS ARE NEEDED WHEN PEOPLE ARE--BUSING PEOPLE OUT OF THE CITY ISN'T FEASIBLE." CLAIMS RESIDENT GROUP IN PETITION.

AA 8 -
SHELTER HOUSE PROPOSED FOR PARK. LOCAL CITIZENS COMPLAIN CONSTANTLY ABOUT POOR PICNIC FACILITIES.

AA 1 -
CITY YOUTH DEMANDS NEW PLAY FIELD EQUIPMENT. OFFICIALS HOWEVER CITE WHOLESALE THIEVERY AND IMPLY YOUTHFUL RACKETEERING.

S U B U R B A N JURISDICTION 2 b

AA 10 -
HOMEOWNERS ASSOCIATIONS DEMAND CITY TAKE IMMEDIATE ACTION TO RESURFACE WINTER-DAMAGED NEIGHBORHOOD STREETS.

AA 20 -
POORLY-CONSTRUCTED SANITARY SEWER SYSTEM CAUSES UNPLEASANT BLOCKAGES. RESIDENTS ARE CALLING FOR REPLACEMENT.

AA 19 -
TASTE OF WATER IS MAKING AREA RESIDENTS SICK. ONLY PERSON BENEFITING IS THE LOCAL CULLIGAN MAN.

AA 19 -
PARENTS GROUP WANTS LOCAL SWIMMING POOL SO CHILDREN WILL KEEP OFF STREETS ON HOT DAYS.

T O W N S H I P 1 (JUR. 3) b

AA 27 -
SAFETY SIGNAL INSTALLATION NECESSARY TO HALT INCREASING PEDESTRIAN ACCIDENTS AT BUSY SHOPPING CENTER INTERSECTION.

AA 21 -
AUTO INDUSTRY HOLDS KEY TO NATIONS FUTURE SAYS CHAMBER OF COMMERCE. PRESSURES POLITICIANS TO BUILD MORE PRIMARY STREETS.

AA 20 -
STORM SEWER EXTENSION DEMANDED BY IRATE CITIZENS. MILDEST SHOWERS TURN UNIMPROVED LOCAL STREETS INTO SOUPY QUAGMIRES.

AA 20 -
THREE FEET OF WATER INUNDATE LOCAL STREETS.ONLY LARGE-SCALE STORM SEWER CONSTRUCTION WILL PREVENT FURTHER OCCURRENCES.

AA 23 -
LOCAL CITIZENS HOPEFUL ABOUT GETTING WATER MAIN EXPANSION. PATIENCE WORN BY MANY DELAYS MAKES IT PRIME POLITICAL ISSUE.

AA 24 -
YOUNG ROWDIES INTIMIDATE TODDLERS IN LOCAL PARK. MOTHERS DEMAND CONSTRUCTION OF INDEPENDENT TOT LOTS.

T O W N S H I P 2 (JUR. 4) b

AA 21 -
STEADILY-INCREASING TRAFFIC FLOW ON PRIMARY THOROUGHFARE IN THE AREA UNDERSCORES NEED FOR WIDENING.

AA 19 -
NEW PRIMARY ROAD PUSHED BY RESIDENT GROUP TO AID COMMUTER CONGESTION PROBLEMS.

AA 22 -
DEVELOPERS CALL UPON CITY TO EXTEND LOCAL SANITARY SEWER MAINS TO AREA RIPE FOR DEVELOPMENT. NEW TRUNKLINES NEEDED.

AA 23 -
MAINSTS FLOODED AND SLAB FOUNDATIONS ERODED AS RAINS OVERFLOW STORM SEWERS. INCREASED CAPACITY CONSIDERED MANDATORY.

AA 19 -
WATER FACILITIES FAIL TO PACE URBAN GROWTH AND PRIVATE WELLS ARE NOT RELIABLE. MAJOR WATER MAIN CONSTRUCTION URGENT.

AA 19 -
COST-BENEFIT SHOWS FOLLY OF PUBLIC ICE SKATING RINK BUT COMMUNITY GROUP CONTINUES TO PRESS ITS DEMANDS ON POLITICIANS.

B U S I N E S S P A G E b

g NEW FIRMS PLANNING TO COME TO A.P.E.X. AREA

SUPER CHICKENS INC (EXOFIRM NO. 4) PREFERS LOCATION IN ANALYSIS AREAS 10 25 17. WILL USE 8.00 ACRES.
WILL HAVE 200 EMPLOYEES AND WILL ADD 572000. DOLLARS TO THE TAX BASE.
POLITICIANS NOTE-- REZONING NEEDED TO V-4 (VACANT INDUSTRIAL).
STREETS COSTING 35000. DOLLARS ARE NEEDED.
REQUIRES INVESTMENT OF AT LEAST $ 200000. BY LOCAL BUSINESSMEN.

ZIPPY FROZEN FOODS INC FREEZER (EXOFIRM NO. 8) PREFERS LOCATION IN ANALYSIS AREAS 5 6 24. WILL USE 3.00 ACRES.
WILL HAVE 90 EMPLOYEES AND WILL ADD 135000. DOLLARS TO THE TAX BASE.
POLITICIANS NOTE-- STREETS COSTING 35000. DOLLARS ARE NEEDED.
REQUIRES INVESTMENT OF AT LEAST $ 25000. BY LOCAL BUSINESSMEN.

MAIL-ADS PRINTERS (EXOFIRM NO. 12) PREFERS LOCATION IN ANALYSIS AREAS 0 0 0. WILL USE 1.50 ACRES.
WILL HAVE 180 EMPLOYEES AND WILL ADD 300000. DOLLARS TO THE TAX BASE.
POLITICIANS NOTE-- REZONING NEEDED TO V-4 (VACANT INDUSTRIAL).
REQUIRES INVESTMENT OF AT LEAST $ 25000. BY LOCAL BUSINESSMEN.