Proceedings of the Technical Association of the Pulp and Paper Industry

1980 ENVIRONMENTAL CONFERENCE

PROCEEDINGS
OF THE
TECHNICAL ASSOCIATION
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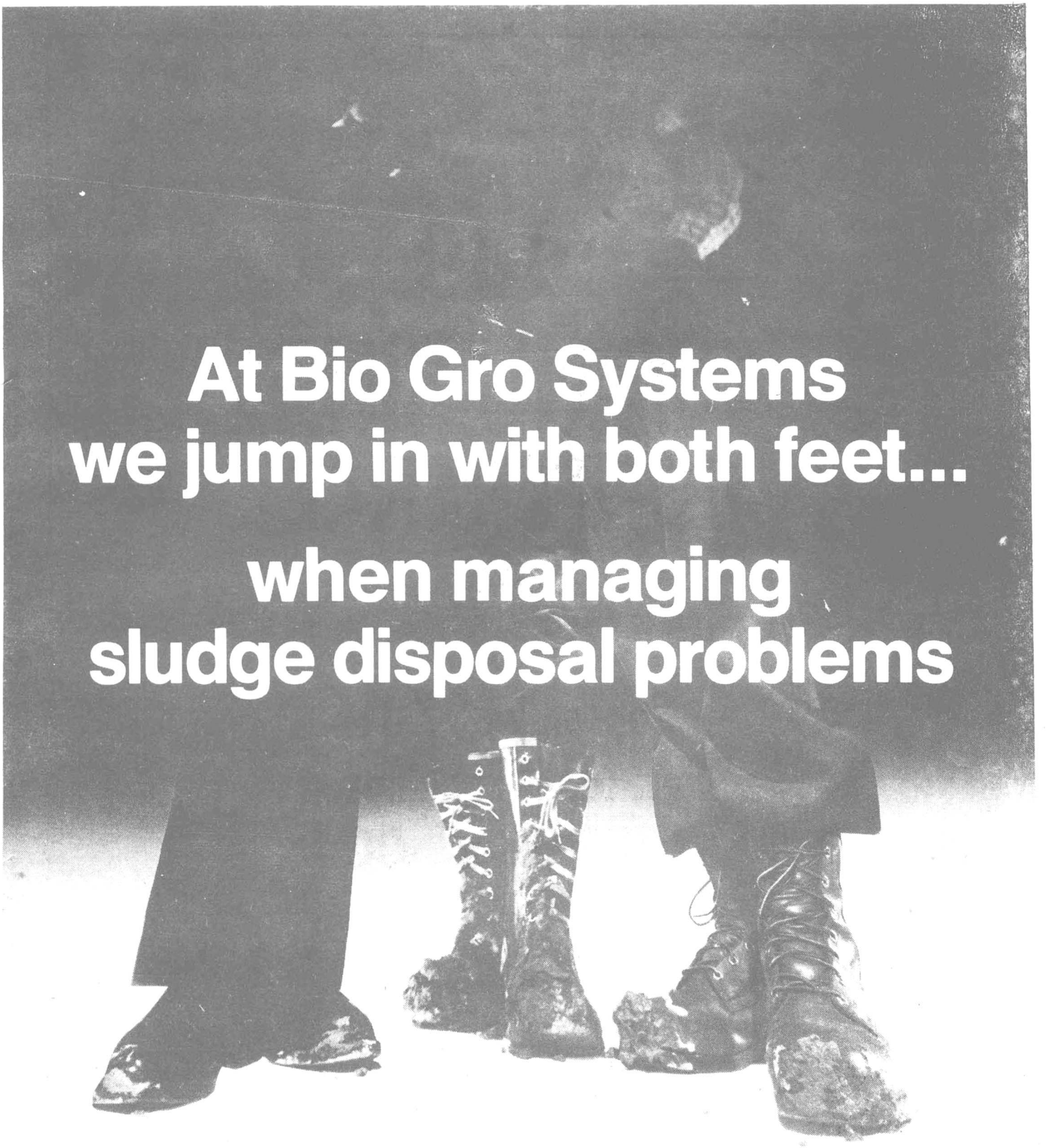

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ABSTRACT

The search for potential sites for the paper industry is more complex today than in the past, with the decreasing availability of desirable sites. Emphasis on more detailed environmental regulations, increasing competition for raw materials, rising land and construction costs, aesthetic sensitivities, and archaeological considerations now compel industry managers to commission detailed investigation of geographical areas of interest in seeking sites with the highest potential.

There is an increasing interest in the paper industry in identifying potential sites for new grass roots mills. Site selection procedures have been used which follow a progressively more detailed, phased approach and which are adaptable to a wide range of circumstances. This paper identifies the points which must be addressed to satisfactorily locate projects with varying product, market, resource, and schedule criteria.

INTRODUCTION

Selection of acceptable sites for construction of new grass roots pulp and paper projects is no longer a relatively simple task. In the past, a civil engineer merely had to seek out timberland areas close to major rivers within convenient distance of rail and highway transportation to assure a reasonable chance of success for project development. Although the industry remains dependent on the proper mix of wood species, adequate water supply, and transportation, the last 20 years have witnessed an increased public and political awareness of the need to more wisely manage air and water resources. This has resulted in a successively more stringent tier of environmental regulations. Coupled with this environmental thrust is the growth of American industry, and in particular that of pulp and paper, which in the major southern sunbelt growth area has claimed most of the easily developed sites.

With, and perhaps as result of, the shrinking availability of prime sites, site selection is currently very active within the paper industry. Companies are seeking sites for a wide variety of production, including TMP newsprint, tissue, bleached kraft fine paper, kraft linerboard and others. Most site selection studies are conducted on as confidential a basis as possible. Although the exact purpose for each company's site selection interest is often not stated outside that company, it appears that most activity is for one or more of the following reasons:

1) To maintain orderly growth of production capacity.

2) To replace old, inefficient facilities which suffer from high labor, manufacturing, or maintenance costs.

3) Competitive pressure: that is, fear of losing position in a particular market because a competitor is moving aggressively to tie up potential sites through option or purchase, for future development.

4) Replacement of sites lost to government or public action.

5) To take advantage of shifts in market or product price, especially where sufficient timber resources or other raw materials are available or under current control.

Sites which might once have been thought marginal are now being evaluated and seriously considered in a comparison with remaining properties. Added to the decreasing availability of quality sites and the pressures of environmental regulations, increased competition for raw materials; rising costs of land acquisition, construction, and operation; aesthetic sensitivities and archaeological considerations; and extended schedules for project development have made site selection a more deliberate and complex part of developing a new pulp and paper mill.

Through the use of progressively more detailed procedures, a site selection study can be expected to correctly identify the sites located within a multi-state region which are viable for construction of any particular pulp and paper project. The same techniques are as valid for locating a mill for tissue production from waste paper in a major metropolitan area, as for a major bleached kraft mill located in an isolated rural setting. Those procedures are practiced by paper company staff and engineering organizations, planners, and engineering consultants and culminate in a comprehensive report presenting criteria for selection, areas considered, and final recommendations for site option and purchase. This report may contain only the very briefest site descriptions (including environmental summaries), site maps, and property ownership information, developed in a one month period. More commonly, the report will contain a more detailed analysis of labor, taxes, and availability of utilities; results of stream and air modeling; aerial and ground photographs; topography; transportation summaries; and confirmation of discussions with state environmental agencies and other governmental or pseudo-governmental agencies such as the U.S. Corps of Engineers and TVA, etc. The detailed investigation and report preparation may take up to six months; however, permit applications, an environmental report or assessment, and a technical and economic feasibility study can proceed directly or concurrently with good assurance of a smoothly developing project.

This paper discusses preliminary, detailed and final site identification and evaluation procedures. Emphasis is placed on aspects of site selection which currently appear most significant in the process of obtaining environmental permits.

PRELIMINARY INVESTIGATION

PROJECT CRITERIA

The first, and a very key step, in site selection is development of the criteria which define a project. Of primary importance are basic production and process data (basic data), primary geographical search area, site criteria, raw materials, product marketing, and project schedule.

Basic data provide the description of production tonnage, both process and product, from which water use, process losses, steam demand, chemical and fuel requirements, etc., are calculated. Effluent characteristics, air emissions and solid waste quantities are then derived from experience, taking into consideration internal and external controls and process designs incorporated to emit less pollutants. Stream assimilative capacity, existing air quality and available increments, and solid waste storage requirements help define limits of stream flow and quality, air quality, and site size, respectively. Of course, NPDES and PSD permits may be based directly or indirectly on product, production tonnage, and fuel input.

SITE CRITERIA

The next step in the preliminary investigation is summarizing site criteria, in tabular form, to provide a clear scope for the ensuing search. This information is brief, but many areas are addressed to allow communication with the agencies and individuals which will supply site information. Table I is an example of site criteria for a new grass roots mill to produce 1000 tons per day of bleached kraft grades.

TABLE I

SITE CRITERIA

Location	Portions of six southern and southeastern states
Size	400-800 hectares (1000-2000 acres)
Topography	Above 100 year flood elevation, with good natural drainage and relatively level terrain
Soil	Sufficient load bearing capacity
Transportation Facilities	
Rail	One good railroad nearby; two railroad capability desirable
Highway	Minimum Class B adjacent, interstate within 80 kilometers (50 miles), 10 percent of raw materials and 15 percent of product by truck
Barge	Not required
Air	Accessible
Utilities	
Electric	2700 kw (balance generated)
Coal	Required
Natural Gas	Not required

TABLE I (Continued)

Water Supply	Proven ground water or river supplies of acceptable quality to provide an estimated 94600 cubic meters per day (25 million gallons per day) of process water.
River	Does not have to be navigable. Must have assimilative capacity to accept a conventional bleached kraft wastewater discharge of 94600 cubic meters per day (25 million gallons per day) and 2720 kilograms per day (6000 pounds per day) of BOD_5 without violating water quality standards.
Air Quality	Must be in an attainment area for all criteria pollutants, and must be in a PSD Class II area.

PRIMARY SEARCH AREA

Raw materials and market primarily dictate the boundaries of a site search area. An adequate wood supply of the proper hardwood/softwood mix or sufficient waste paper, are the principal raw materials. Availability of timberlands must be researched either through an outside study, review of company ownership and control through leasing, or by other means. Marketing studies may also be prepared at this point, including investigation of the costs of transporting raw materials to the site and the finished product to the market area. Based on current control of timber producing properties and location of existing mills, a site search area may be limited to select portions of only a few states, or it may cover an entire region of the United States.

SITE SIZE

Land requirements for a new paper mill vary with the type process and production. For instance, without a pulp mill, a bleach plant, a recovery boiler, a chip and roundwood storage area, a mill producing over 1000 tons per day from waste paper may require only 40 hectares (100 acres) for the basic production area and 200 hectares (500 acres) for the total site. A bleached kraft mill of the same size, however, could easily require 80 to 120 hectares (200 to 300 acres) for the manufacturing area within a total site of 400 to 800 hectares (1000 to 2000 acres). In addition, many companies elect to purchase as much available surrounding land as possible to avoid problems with adjoining owners and to allow for future expansion. Sites of 1600 to 2000 hectares (4000 to 5000 acres) are not uncommon. Following in Table II are typical land requirements for a 1000 ton per day kraft mill.

TABLE II

TYPICAL LAND REQUIREMENTS

Manufacturing Process Area	80-120 hectares	(200-300 acres)
Wastewater Treatment and Storage	80-120 hectares	(200-300 acres)
Solid Waste Landfill, 25 year life (includes provisions for dewatered process sludge, process water treatment sludge, trash, boiler ash, and SO_2 scrubber sludge)	120-200 hectares	(300-500 acres)
Buffer area 300 meters (1000 feet) wide	160 hectares	(400 acres)
Total Area	450-600 hectares	(1100-1500 acres)

SITE IDENTIFICATION

The search for prospective sites begins in-house with a review of files developed in previous investigations. State highway maps, county maps, and U.S. Geological Survey (USGS) quad sheets are consulted for locations within or close to the geographical area with active rail lines near waterways. Following this review, state and local industrial development agencies, developers with railroad and power companies and others are contacted to develop a list of prospective sites. Sites appearing to meet specifications and that are feasible for a specific project are included, and those which have not previously been inspected are visited. Often, additional sites will be discovered through field visits.

SITE EVALUATION

The preliminary list of candidate sites is screened, using preliminary information. Available site brochures often describe rail location and service and provide site topography, flood level, preliminary assessment of ownership and availability, utility availability, and other useful data. In-house reference files are researched for air and water quality data. The Water Resources Data books published annually by the USGS in conjunction with state regulatory agencies provide flow and water quality data for selected stream gaging and water quality monitoring stations. State regulatory agencies also publish annual summaries of air quality data. The USGS may be contacted

or USGS low-flow frequency publications may be reviewed to determine the 7 day 10 year low-flow for stations in the proximity of the proposed sites. The Federal Register may be reviewed for air quality nonattainment designations.

As a guide, treated effluent limitations for the proposed project are calculated based on EPA New Source Performance Standards (NSPS) or Best Available Treatment (BAT) guidelines. Desk calculations are made using the Streeter and Phelps concept, to determine preliminary assimilative capacity of proposed receiving streams under low-flow conditions. Air emissions are calculated based on (NSPS) and Best Available Control Technology BACT and an air quality screening analysis may be performed using assumed worst case meteorological conditions. During screening, state regulatory officials are contacted to informally and confidentially ascertain the potential for siting the project at specific locations. Since the ultimate selection of a site will depend upon the ability to obtain air and wastewater permits, contact with regulatory agencies is an important element of the screening process. Many companies prefer that these contacts be confidential in nature, and most state regulatory agencies are cooperative.

The preliminary investigation results in reducing the number of sites from potentially well over 100 sites to a short list which may contain five to ten sites. A preliminary investigation report is prepared containing recommendations for the short list of sites which appear to best meet site criteria and which must be evaluated in detail. In summary, the short list of sites is determined by evaluating the following:

1) Site information from various sources.

2) Discussions with regulatory agencies.

3) Probability of obtaining environmental permits.

4) Site inspection trips.

5) Viability of sites based on past experience.

6) Paper company review.

DETAILED INVESTIGATION

The detailed investigation of sites recommended in the preliminary investigation short list entails in-depth review of each criteria discussed previously. Joint visits of site investigators and company representatives are encouraged at this point, and if possible, sites are viewed from the air and are covered on foot. Additional information is collected through contact with USGS, regulatory agencies, and other public sources to obtain all published environmental data for the selected sites. As previously stated, the ultimate selection of a site will depend on the ability to obtain environmental permits. Therefore, additional work is performed during the detailed investigation phase to accurately assess the probability of obtaining these permits

WASTEWATER PERMIT

With regard to stream information, the state regulatory agency will provide access to the Storet Data Files for all pertinent water quality monitoring stations on the proposed receiving streams. Following this, preliminary models are developed using DOSAG, Qual-II, and/or others to determine the assimilative capacity of the receiving streams and the effect of the proposed effluent discharge on the dissolved oxygen profile. Streams are tested with the aid of the computer model, to determine if effluent discharge can be continuous, based on NSPS or BAT limitations, or for streams where water quality is the limiting factor, if an intermittent or regulated discharge is required. For a regulated discharge, the volume of treated effluent storage necessary to maintain water quality standards is estimated. Regulatory agencies are visited at this point for discussion of requirements for granting NPDES permits for particular sites, including schedule, information and supporting studies. The necessity for preparing an environmental report or assessment, archaeological or biological screening and stream studies is specifically questioned as is the history of past local opposition to industrial projects. In the case of projects which are proceeding directly to design and construction following final selection of a site, company environmental or management personnel may wish to attend meetings with regulatory agencies at this point.

AIR PERMIT

Regulatory agencies are also visited to discuss the important aspects of air quality related to each prospective site. The checklist which follows in Table III can be used to cover the most critical points for each site.

TABLE III

AIR QUALITY CHECKLIST

- Attainment status for all pollutants
- Pre-construction air monitoring requirements
- Nearby sources
- Availability of emission inventories and stack parameters
- Air modeling requirements
- Meteorological data requirements

TABLE III (Continued)

- New source/PSD requirements
- Other special requirements

Following these more detailed discussions a non-site specific air quality modeling screening analysis may be performed using either assumed worst case meteorological conditions or actual, representative worst case meteorological conditions. Ideally, a potential site will have no significant impact upon a PSD Class I area, will have the full PSD increment available, will avoid significant existing sources, will have no complex terrain features, and will be located in a state with full PSD authority. By adhering to previously discussed site air quality criteria plus the above, a permit to construct an air pollution source should be obtained with a minimum of red tape.

OTHER CONSIDERATIONS

In addition to addressing the primary environmental issues, analyses may be conducted of solid waste disposal; site construction cost variables; socio-economic issues such as transportation, local taxes, community planning, labor availability, etc.; site interferences, and possible negative interests. Many of the issues of importance to the site selection procedure are addressed in more detail when preparing an environmental assessment. Good coverage of environmental assessment requirements are presented by Stovall (1) and will not be repeated here.

Listed in Table IV are some of the more common interferences and negative interests, which must be addressed in site planning, and which in some cases may cause a prospective site to be removed from further consideration.

TABLE IV

SITE INTERFERENCES AND NEGATIVE INTERESTS

- Rights of way and easements for major power transmission lines, gas and oil pipelines, railroads, etc.
- Cemeteries
- Archaeologically or historically significant areas
- Drainage ways, flood zones and flood protection levees
- Residences and public buildings
- Receiving stream impoundments above or below the site
- Public or industrial water intakes downstream
- Population downwind
- Noise or aesthetic effect
- Nearby recreational areas, public parks, wildlife refuges
- Large number of property owners
- Property shape and divisions
- Public or industrial attitudes

Using decision making techniques, the final sites are selected based on the investigator's recommendation and the company's review. Sites may be placed under option to allow final selection studies to take place.

FINAL SITE INVESTIGATION

The comprehensive investigation of final sites begins when the company obtains options to purchase the sites. Topographical survey, soils investigation with subsurface borings, and archaeological surveys are conducted. If necessary, a water quality sampling program of the receiving streams and air quality monitoring stations for ambient air are established to collect additional data. Single source or multi-source site specific air quality modeling analyses are performed.

Field studies in the receiving stream are performed to determine time of travel and reaeration rate coefficients during low-flow stream conditions. The final model is developed for the proposed receiving stream, utilizing DOSAG, Qual-II, and/or the model preferred by the state regulatory agency to conduct final determinations of the effects of the proposed effluent discharge on the stream.

In addition to air and water permits, other permit requirements are assessed. This includes Corps of Engineer permits for intake, outfall and barge dock construction in the stream, and for wetlands.

With regard to solid waste disposal, soils permeability and hence the necessity of a landfill liner, terrain suitability, availability of cover material, and the location of groundwater are determined.

At this point a site development cost estimate may be prepared, allowing comparison of two or more sites. The items listed in Table V are often considered.

TABLE V

SITE DEVELOPMENT COSTS

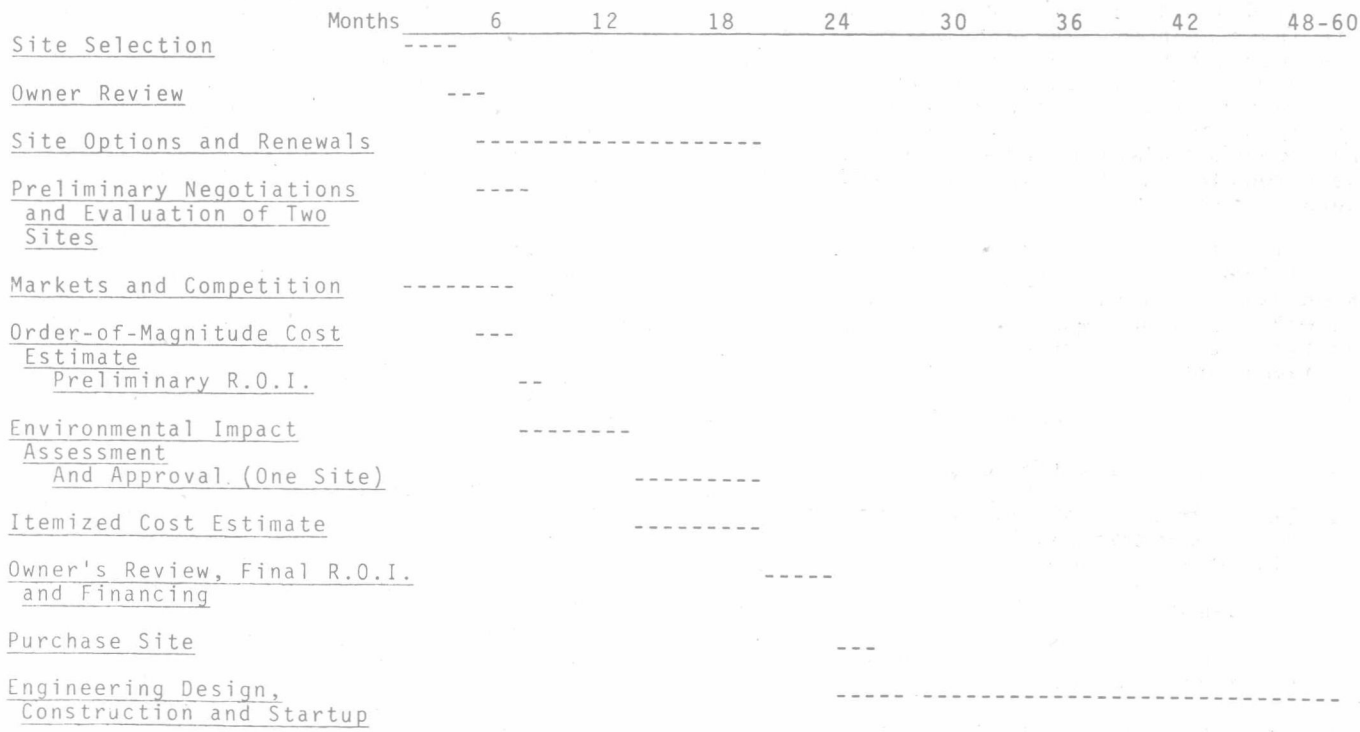
- Water supply
- Wastewater treatment, including storage
- Land
- Site preparation (clearing and grubbing) and grading
- Rail and highway access or improvement
- Wastewater lines
- Utility service (electric power, gas, etc.)
- Special foundation requirements
- Removal or relocation of interferences

Other final site investigations include determining exact land requirements, confirming the availability and cost of the property, and negotiating with railroads and county governments. This phase completes the necessary site investigation. If not previously addressed, planning functions and socio-economic issues must be considered.

In developing the entire project, site selection studies will be followed by the preparation of order of magnitude construction cost estimates, detailed construction cost estimates, preparation of an environmental impact assessment, application for environmental permits, detailed design, and construction. Pre- and post-startup biological studies on the receiving stream should also be a part of project development. A schedule for project development, including site selection, follows as Table VI. Actual purchase of property should be contingent upon expected approval of the required permits.

TABLE VI

PROJECT SCHEDULE



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