

## SITE CONSIDERATION AND PLANT LAYOUT

The location of the plant can have a crucial effect on the profitability of a project, and the scope for future expansion. Factors considered while selecting a plant site are:

- Transportation
- Sources and costs of raw materials
- Prospective market for products
- Corporation long range planning
- Water source - quality and quantity
- Special incentive
- Climatic conditions
- Pollution requirements(Waste disposal)
- Utilities - cost, quantity and reliability; fuel - costs, reliability and availability
- Amount of site preparation necessary(site conditions)
- Construction costs
- Operating labor
- Taxes
- Living conditions
- Corrosion
- Expansion possibilities
- Other factors.

Three factors are usually considered the most important. These are the location of the markets and raw materials and the type of transportation to be used.

**Transportation:** The transport of materials and products to and from the plant will be an overriding consideration in site selection.

If practicable , a site should be selected that is close to at least two major forms of transport : road , rail, waterway (canal or river ) , or a sea port .

The least expensive method of shipping is usually by water; the most expensive is by truck.

**Raw materials:** The availability and price of suitable raw materials will often determine the site location. Propylene is the major raw material for the manufacture of Acrylic acid , hence the plant can be located near any plant producing propylene . It will reduce transportation and storage costs.

**Location of markets:** Consumer products often are delivered in small shipment to a large number of customers. In an international market, there may be an advantage to be gained by locating the plant within an area with preferential tariff agreements. Since acrylic acid acts as a raw material for the production of consumer goods like paints,

plastics, pharmaceutical binders etc. , it is always advantages for the plant to be situated in a industrial area .

**Long Range Corporate Planning:** The object of long range planning is to optimize a whole network of operations instead of each one individually. This means that each plant site is not considered only for itself and that its chosen location might not be the one that would be selected if only the economics of the one plant had been considered. Placing the plants throughout the country allows each plant to be located optimally.

**Water :** water is needed by every processing plant for a number of different purposes. Potable water is needed for drinking and food preparation.

The plant site must have an adequate amount of each type of water at all times of the year. Not only the amount and quality but the temperature of the water is important. The size of the heat exchanger is inversely proportional to the temperature difference between the cooling water and the material being cooled.

**Climatic Conditions:** Adverse climatic conditions at a site will increase costs. Abnormally low temperatures will require the provision of additional insulation and special heating for equipment and pipe runs. Stronger structures will be needed at locations subject to high winds or earthquake.

**Pollution and Ecological Factors:** All industrial processes produce waste products , and full consideration must be given to the difficulties and cost of their disposal. The disposal of toxic and harmful effluents will be covered by local regulations, and the appropriate authorities must be consulted during the initial site survey to determine the standards must be met.

**Site Conditions:** An ideal chemical plant site is above the flood plain, flat, has good drainage , a high soil- bearing capability , and consists of sufficient land for the proposed plant and for future expansion.

**Availability of labor :** Labor will be needed for construction of the plant and its operation. Skilled construction workers will usually be brought in from outside the site area, but there should be an adequate pool of unskilled labor available locally; and labor suitable for training to operate the plant.

**Political and Strategic considerations:** Capital grants , tax concession and other inducements are often given by governments to direct new investment to preferred locations; such as areas of high unemployment.

**Local Community Considerations:** The proposed plant must fit in with and be acceptable to the local community. On a new site , the local community must be able to provide adequate facilities for the plant personnel: Schools, banks, housing and recreational and cultural facilities.

**Corrosion:** Once the general area for the plant has been determined , the effect of neighboring industries should be considered when picking the specific site. Their presence may indicate an increased corrosion rate .

#### **PLANT LAYOUT :**

The economic construction and efficient operation of a process depend on how well the plant and equipment specified on the process flow sheet is laid out. The principal factors to be considered are:

- Economic consideration : construction and operating costs.
- The process requirement.
- Convenience of operation.
- Convenience of maintenance
- Safety.
- Future expansion
- Modular construction

**Costs :** The cost of construction can be minimized by adopting a layout that gives the shortest run of connecting pipe between equipment, and the least amount of structural steel works.

**Operation :** Equipment that needs to have frequent operator attention should be located convenient to the control room. Valves, sample points and instruments should be located at convenient positions and heights. Sufficient working space and headroom must be provided to allow easy access to equipments.

**Safety :** Blast walls may be needed to isolate potentially hazardous equipment, and confine the effects of an explosion.

At least two escape routes for operators must be provided from each level in process buildings.

**Plant expansion :** Equipments should be located so that it can be conveniently tied in with future expansion of the process.

**Modular construction :** In recent years there has been a move to assemble sections of plant at the plant manufacturer's site. These modules will include the equipment , structural steel , piping and instrumentation. The modules are then transported to the plant site, by road or sea.

**General consideration** : Open, structural steelwork , building are normally used for process equipment; closed buildings are only used for process operations that require protection from the weather.