Chapter 5
PLANNING CONSIDERATIONS

ENVIRONMENT

Prime power operations are affected by the environment in which they are conducted. The most important environmental factors to consider when planning for prime power support are climate, terrain and vegetation, and lighting.

Climate

Climatic conditions in some locations affect prime power operations. The low temperatures and short periods of daylight encountered during winter in polar regions will adversely affect manpower efficiency but will not degrade equipment performance. Under these conditions, expect significant work-rate slowdowns.

Operations in tropical and coastal regions require additional equipment maintenance to combat corrosion from humidity and salt spray. Generator performance is degraded by humidity and high temperatures in tropical regions. Under extreme conditions, power-plant output may have to be derated as much as 25 percent to compensate for this degradation.

Operations in desert regions require intense and frequent maintenance due to heat and dust. Grounding problems are often encountered in these arid climates due to extremely high soil resistivity. Units may have to construct grounding grids and use soil additives and water to overcome grounding problems.

In mountainous regions above 5,000 feet, the thin air degrades the performance of power-generation equipment. It also reduces manpower efficiency. To compensate, units should derate generators and anticipate slower work rates with frequent rest breaks.

Terrain and Vegetation

Rugged terrain and dense vegetation may affect plant siting and distribution system routing. Each generator and control van in a power plant requires a prepared level surface. Plant sites may need to be cleared and leveled before preparing generator-unit pads.

Rugged terrain and dense vegetation may restrict construction of distribution lines to cleared areas such as roadways. These restrictions can result in longer lengths of distribution line, increased conductor sizes, and additional manpower requirements. Equipment used in laying distribution cable is not suited for cross-country use in rugged terrain.

Lighting

Artificial lighting is necessary when constructing or repairing distribution systems at night. The hazards associated with electrical construction and repair are deadly. They are greatly compounded if work is attempted under blackout conditions.

THREAT

Power plants and transmission and distribution networks are likely targets for sabotoge. Large commercial power plants are likely targets for long-range, surface-to-surface missiles and aerial raids. Prime power plants, especially those powering critical facilities, and their associated distribution networks are also likely sabotage targets. Recognizing the vulnerability of these lucrative targets is important to their defense. Additionally, prime power plants and many commercial power plants have significant noise and heat signatures. This fact should be considered when threat capabilities include infrared or thermal-imagery surveillance and targeting.

TIME

Plant relocation and installation and distribution system construction take time. This is significant in that it precludes the rapid relocation and setup of power plants and their associated distribution networks. Generally, it is feasible to install a prime power plant for units or activities that plan to use it for 30 days or more. This time frame is subject to other factors such as availability of distribution materials and the level of reliability required. Units and activities that relocate often should use TACGENS or relocate to facilities powered by the commercial grid or an existing prime power plant. Expanding an existing prime power plant and its distribution network is usually more practical than relocating it.

THEATER INFRASTRUCTURE LEVEL

Planners should consider how developed the TO infrastructure is in terms of developed utilities, skilled labor work force, sustainable power sources, and so forth. Initially, theaters with less developed infrastructures will probably require more prime power support effort than those that are well developed. During war, however, developed infrastructures can be crippled in a short amount of time. Depending on the extent of damage, restoration of commercial power can take months or years. Loss of commercial power production will be detrimental to military operations and disastrous for civilian activities. It will also greatly increase the demand for electric power produced from TACGENS, nonstandard generators, and prime power plants.

When developing the Civil Engineer Support Plan (CESP) at the unified and specified command level, planners should consider the impact of extensive war-damaged electrical utilities. They should also determine the requirement for prime power support to provide electricity to critical facilities under these circumstances.

Logistics planners should consider the availability of sources for power-related materials in the theater. This includes generators, distribution cable and wire, connecting devices, switch boxes, transformers, protective devices, and so forth. Planners should also consider the availability and reliability of potential sources for power-related service and performance contracts. Materials and services not locally available have to be imported to the TO.

Planners should also consider distribution voltage and frequency. This is critical if plans call for using commercial power. When voltage and frequency are not compatible with intended use, they must be altered or power must be obtained from an alternate, compatible source. Appendix C lists frequency and voltage of worldwide power systems.

PERSONNEL

Prime power production specialists are highly skilled technicians. Their training and experience give them a strong background in electrical theory and practical application. This enables them to perform the power-related tasks discussed in chapters 2 and 3. Another facet not previously discussed is their ability to supervise and manage power-related projects using unskilled and semiskilled troops and indigenous workers. This function is especially useful when mission manpower requirements exceed prime power unit capabilities. Prime power team members can also train and supervise semiskilled troops and indigenous workers in power plant operations. Personnel with some electrical background, such as interior electricians or generator mechanics, are likely candidates. Once trained, these personnel can assist with power-plant operations, thereby freeing team members for additional missions.

CONSTRUCTION SUPPORT REQUIREMENTS

Establishment of a prime power plant normally requires construction effort beyond the capability of the team. Site preparation in a bare base theater includes basic earthwork (clearing, grubing, leveling, and compaction) that must be accomplished by an engineer construction unit or a local contractor. Distribution system installation may require ditch construction and/or pole erection. In addition, overhead-line installation and repairs normally require support from others. Planning for prime power plants must include these tasks, as a minimum.

LOGISTICAL SUPPORT REQUIREMENTS

Prime power operations require considerable logistical support. Power-plant operations and distribution construction account for most of the logistical requirements.

Supply

Large quantities of material are required in the construction of nonstandard distribution systems. Prime power units deploy with only a small, basic no-mission load of these items. However, the wide diversity of this material makes it impossible for a prime power unit to maintain a stockage level adequate to accomplish construction tasks. Therefore, prime power units rely on supported units to acquire construction materials. These materials are available through normal supply channels and, in some theaters, through contracting, local procurement, and host-nation supply.

Operation of a prime power plant requires a daily resupply of diesel. Fuel is normally delivered to the power plant by the supported unit. Consumption rate depends on plant size and electrical load and varies from 40 gallons per hour (GPH) to 220 GPH. The supported unit also provides the Class III packaged products required for generator services.

When deployed independently, prime power teams require support from their attached or OPCON higher HQ for all classes of supply. The team receives this support from the prime power engineer company when the team and company are deployed together. The prime power engineer company and the battalion HHD establish supply accounts and provide for their subordinate teams. The battalion provides highly specialized Class IV, VII, and IX items associated with prime power assets.

Transportation

Prime power units require transportation support to relocate power plants and associated equipment. All equipment, including generators, cable, control vans, and transformers, can be transported on flatbed or lowboy trailers. Mobile substations are trailer mounted and only require tractor support to move. Organic equipment can also be moved by air.

Materials Handling Equipment (MHE)

Prime power companies and teams require MHE support to upload and download equipment subsequent to relocation. Usually, a 40-ton crane or two 20-ton cranes and a 10,000 pound rough-terrain (RT) forklift can support this requirement. Forklift support beyond the teams' organic capability may also be required when constructing distribution networks. Units involved in repairing and

making connections to overhead distribution networks may require the use of a bucket truck.

Services

Mess, laundry and bath, chaplain, medical, and all other troop life support services must be provided. These services are normally obtained through either the higher HQ or the supported unit.

Maintenance

All levels of maintenance through GS can be performed on prime power equipment within the battalion. All levels of maintenance above operator level must be provided by another unit for their tactical vehicles and other common items.

Communications

Prime power units have very little organic tactical communications equipment. Each power plant is equipped with a field telephone, but all other communications requirements must be provided by another unit.

SAFETY

Working with and using electrical systems poses certain hazards. Mistakes and accidents can result in electrical fires as well as death by electrocution. For this reason, prime power units continually stress and practice safety and quality control in all work. Prime power personnel do not work on energized medium or services must be provided. They de-energize these circuits before performing work and keep them de-energized using caution and clearance (lockout/tagout) procedures. They also perform a safety inspection of circuits before energizing them. The current NEC is used as a quality standard for materials and methods where applicable. The National Electrical Safety Code (NESC), DA safety regulations, and Occupational Safety and Health Administration (OSHA) regulations are also followed very closely.