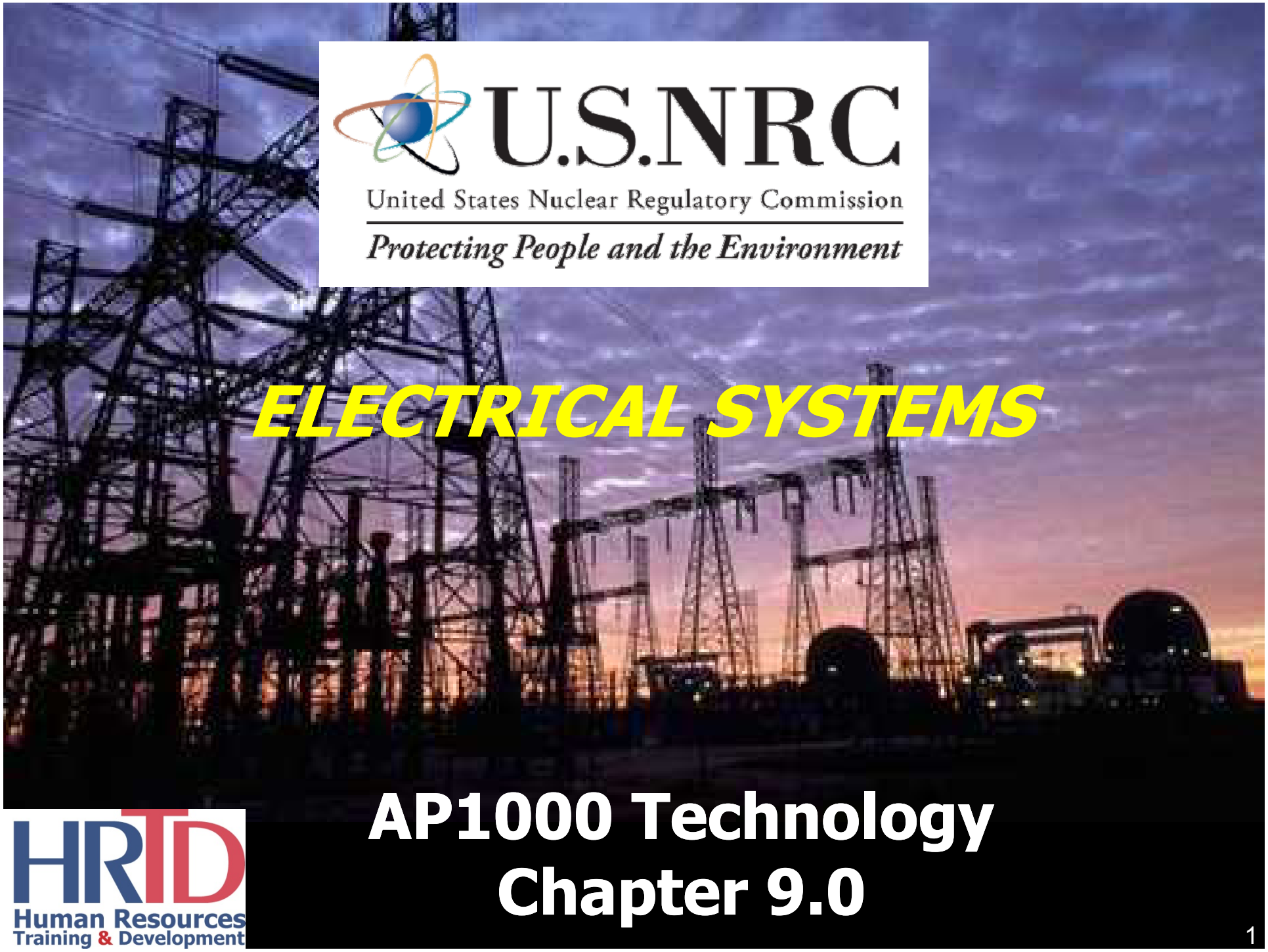

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment
ELECTRICAL SYSTEMS
AP1000 Technology
Chapter 9.0
HRTD
Human Resources
Training & Development

Objective 1

State the purpose of the following:

a. Onsite standby diesel generators

b. Ancillary ac diesel generators

c. Class 1E 250 Vdc distribution system

d. Class 1E uninterruptible power supplies (UPS)

e. Non-Class 1E dc and UPS system

Objective 2

Describe the major differences between the AP1000 and current operating Westinghouse plants onsite electrical system designs.

Onsite Power Systems

- Non-Class 1E main ac power system

- The dc power system consists of two independent systems:
  - Class 1E dc system and
  - non-Class 1E dc system

Onsite AC Power System

- Non-Class 1E comprised of normal, preferred, maintenance, and standby power supplies.
- Normal: TG supplies plant power during normal power operation.
- Preferred: Shutdown power normally provided via the switchyard.
- Maintenance: Site specific through reserve auxiliary transformers (backup to preferred supply)

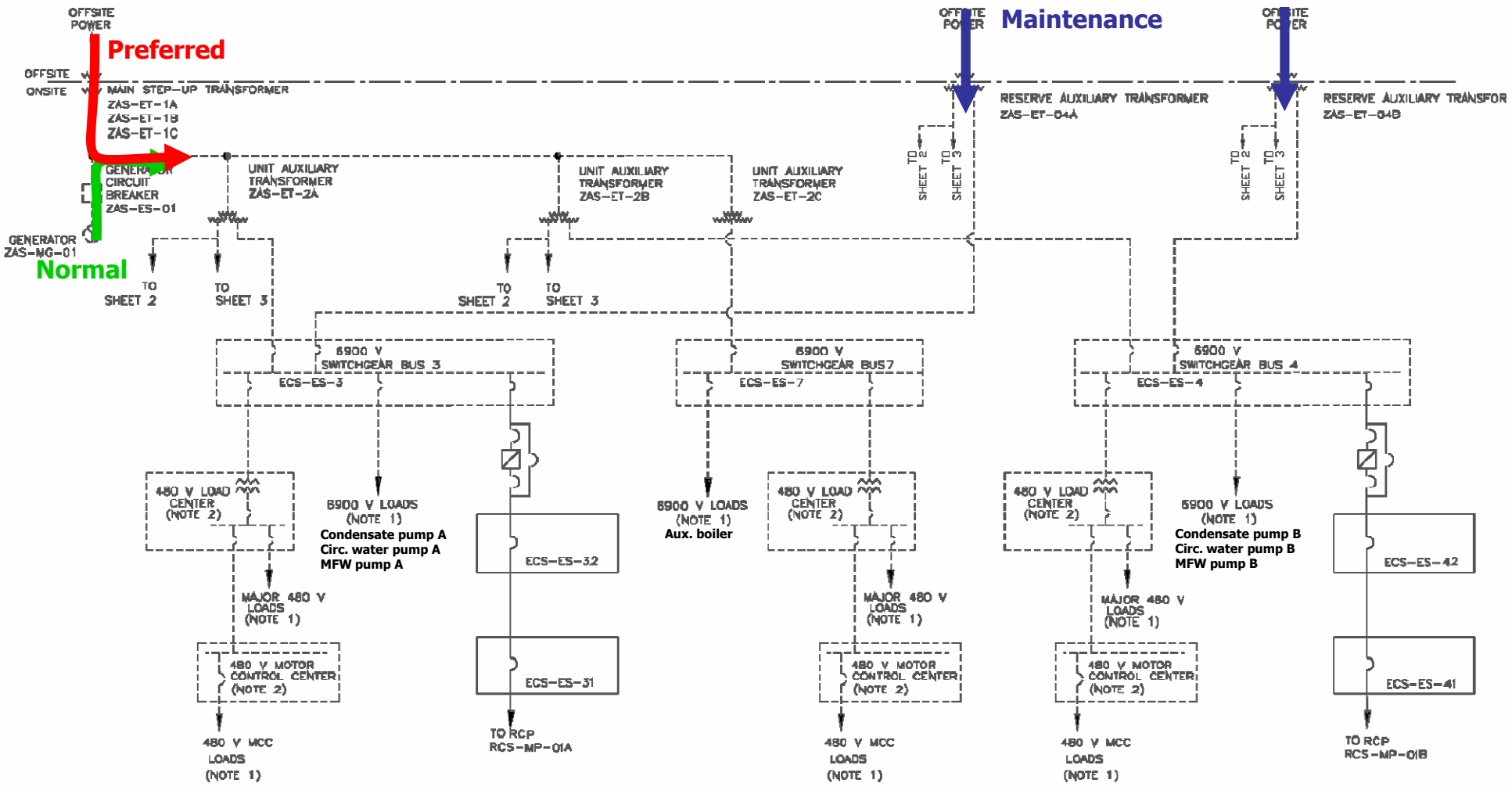
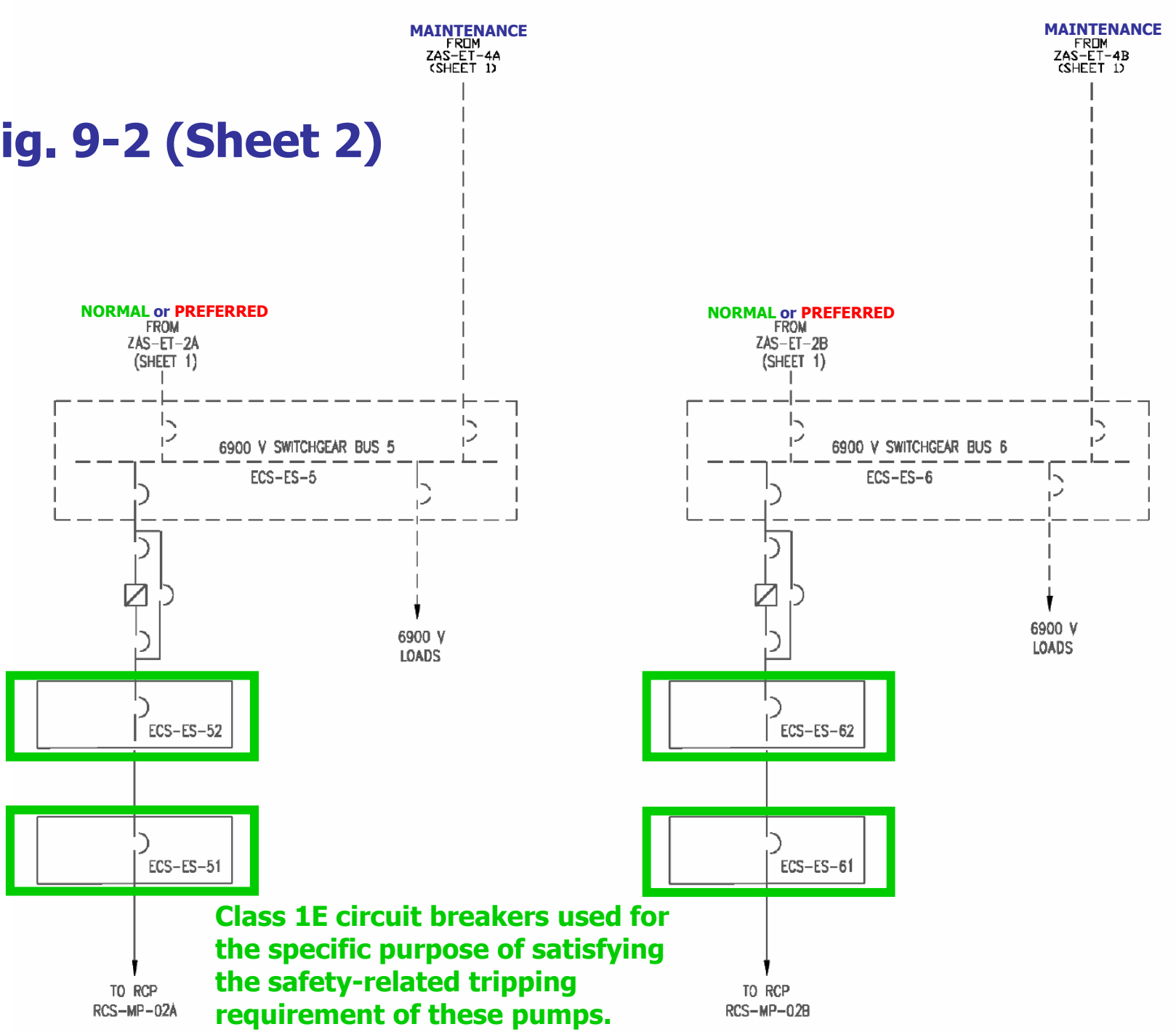


Fig. 9-2 (Sheet 1)

The plant is designed to sustain a load rejection from 100 percent power with the turbine generator continuing stable operation while supplying the plant house loads.

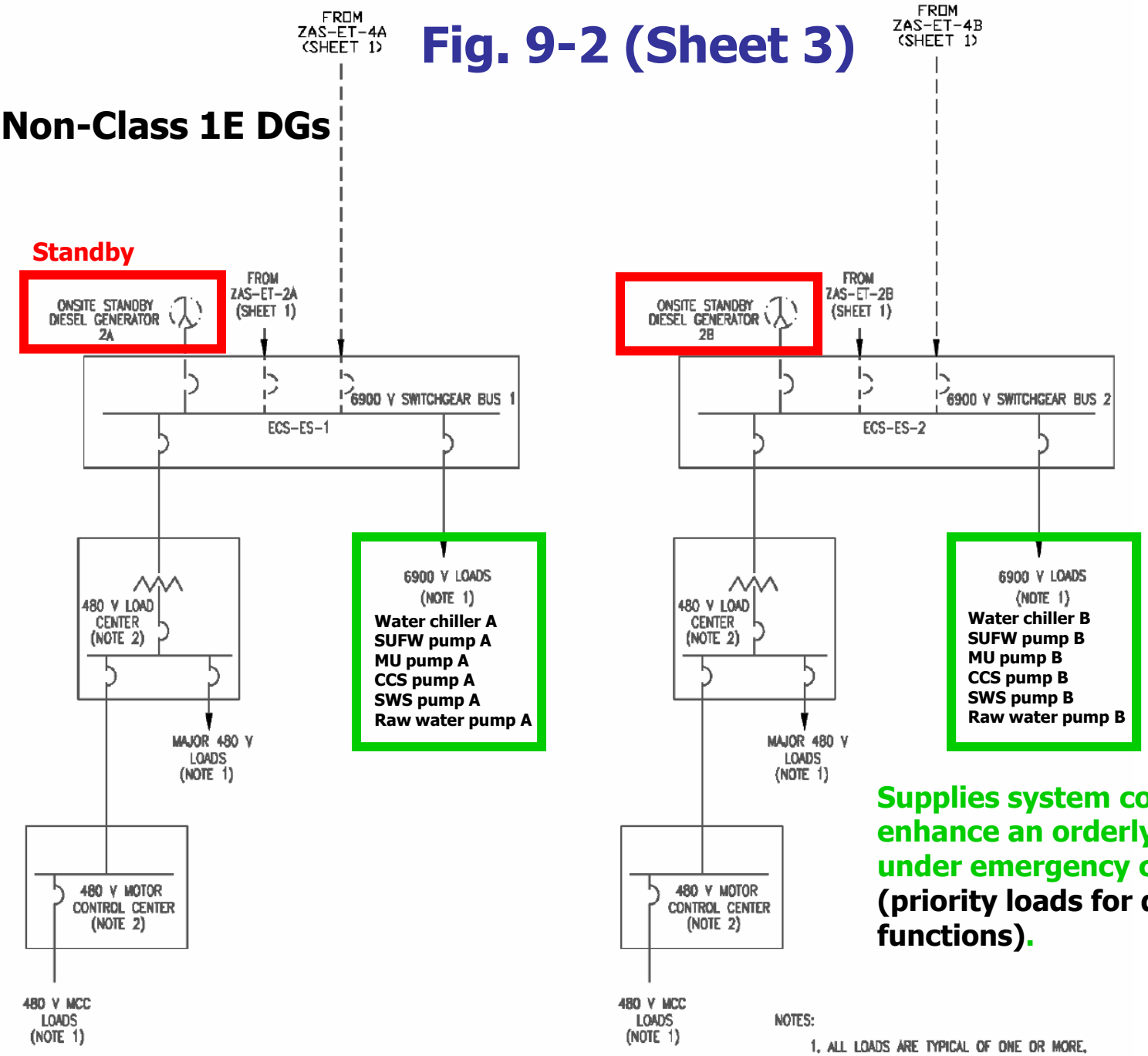
Fig. 9-2 (Sheet 2)



Class 1E circuit breakers used for the specific purpose of satisfying the safety-related tripping requirement of these pumps.

Fig. 9-2 (Sheet 3)

Non-Class 1E DGs



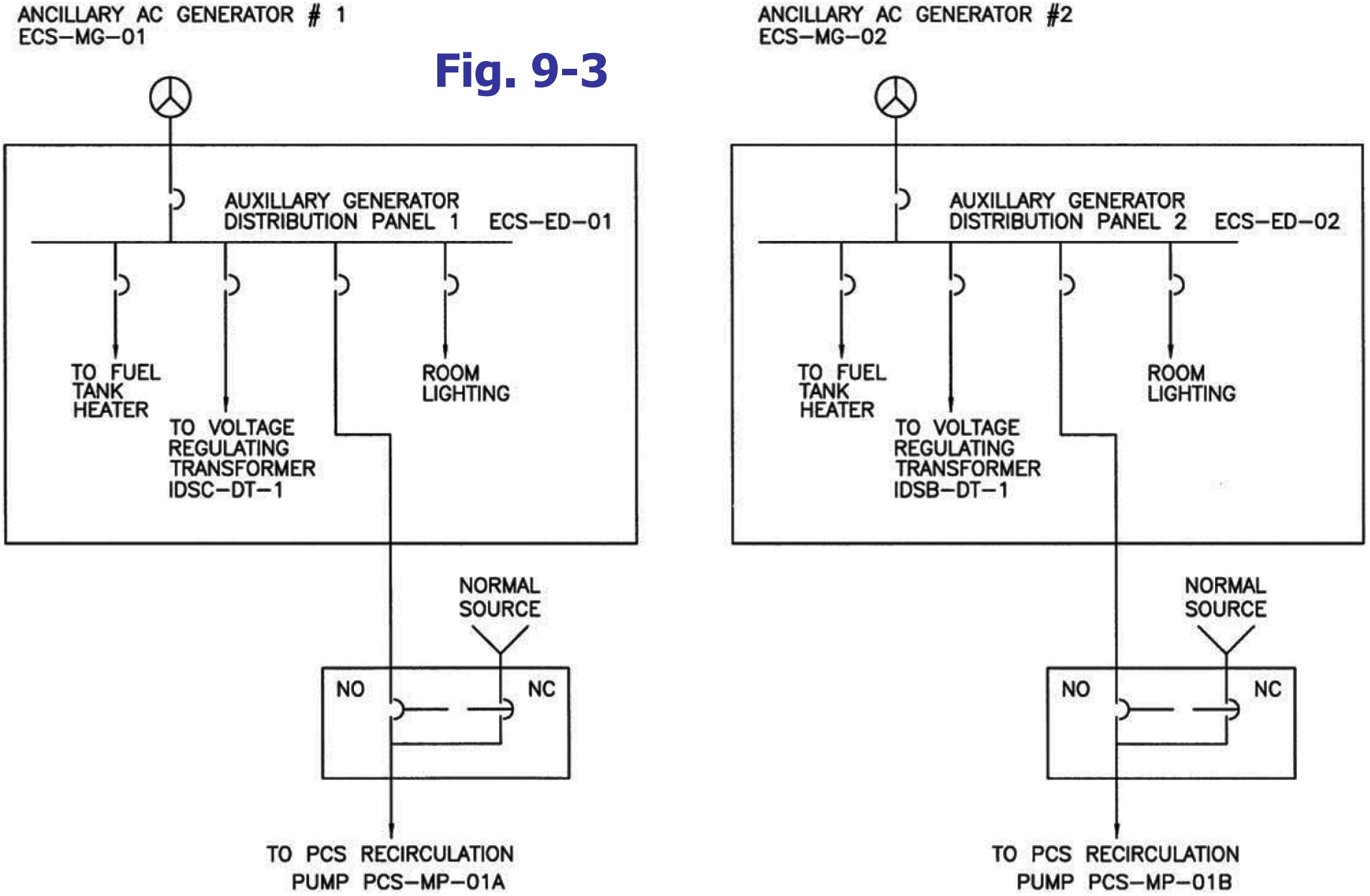
Supplies system components that enhance an orderly plant shutdown under emergency conditions (priority loads for defense-in-depth functions).

Ancillary AC Diesel Generators

Provide backup power for:

- Post-accident monitoring loads, MCR lighting, and MCR ventilation.
- PCS recirculation pump to refill the PCS water storage tank and the spent fuel pool.
- Local loads to support operation of the ancillary generator (lighting and fuel tank heating).

Fig. 9-3



The ancillary generators are not <u>needed</u> for the <u>first 72</u> hours following a loss of all other ac sources.

Non-Class 1E DC & UPS System

- Provides dc and uninterruptible ac power to plant non-Class 1E loads:
  - that are critical for plant operation,
  - investment protection, and
  - hydrogen igniters located inside containment.
- The onsite standby DG-backed 480 Vac distribution system provides the normal ac power to the battery chargers.
- The batteries are sized to supply the system loads for two hours after loss of all ac power.

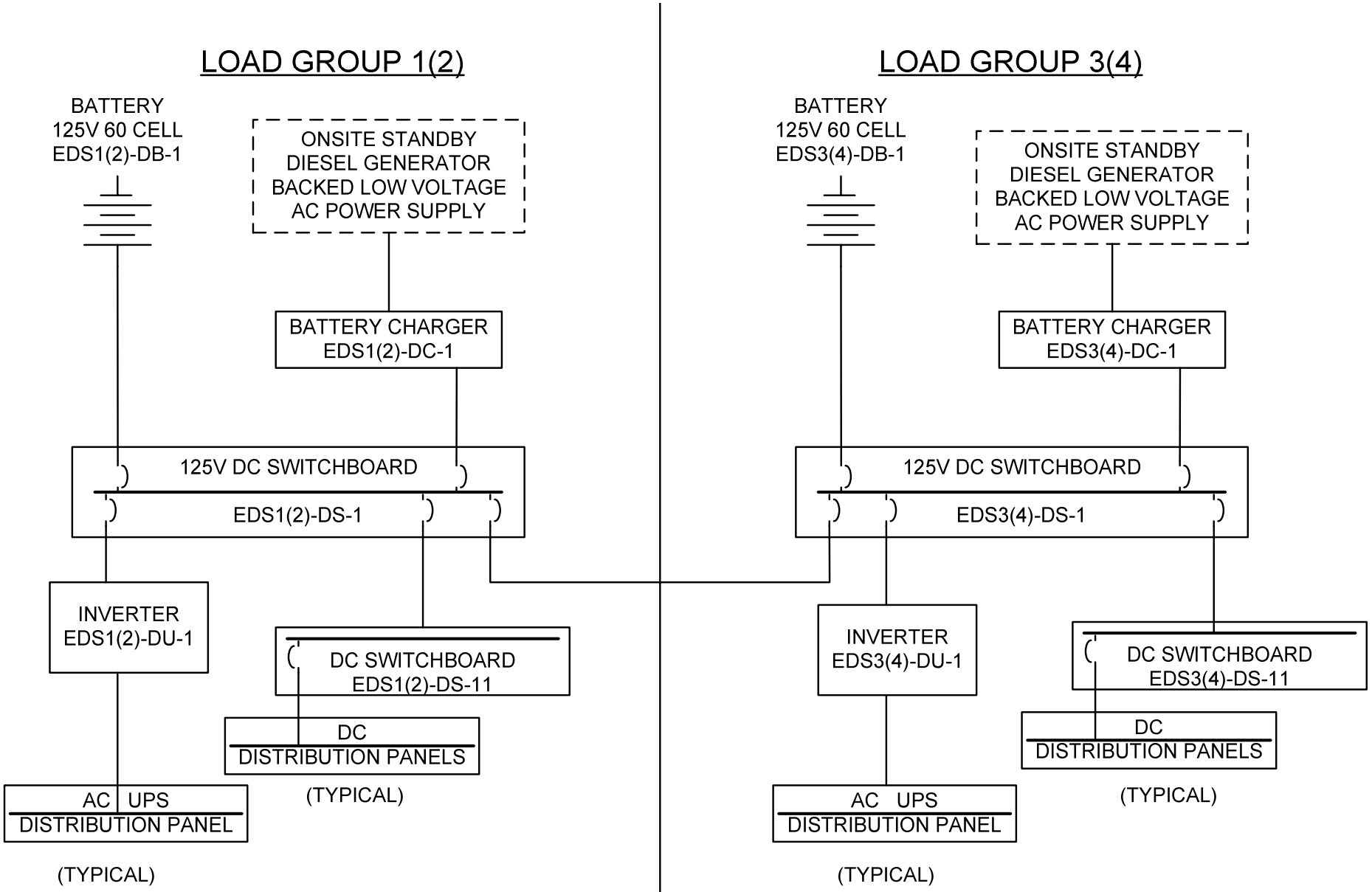
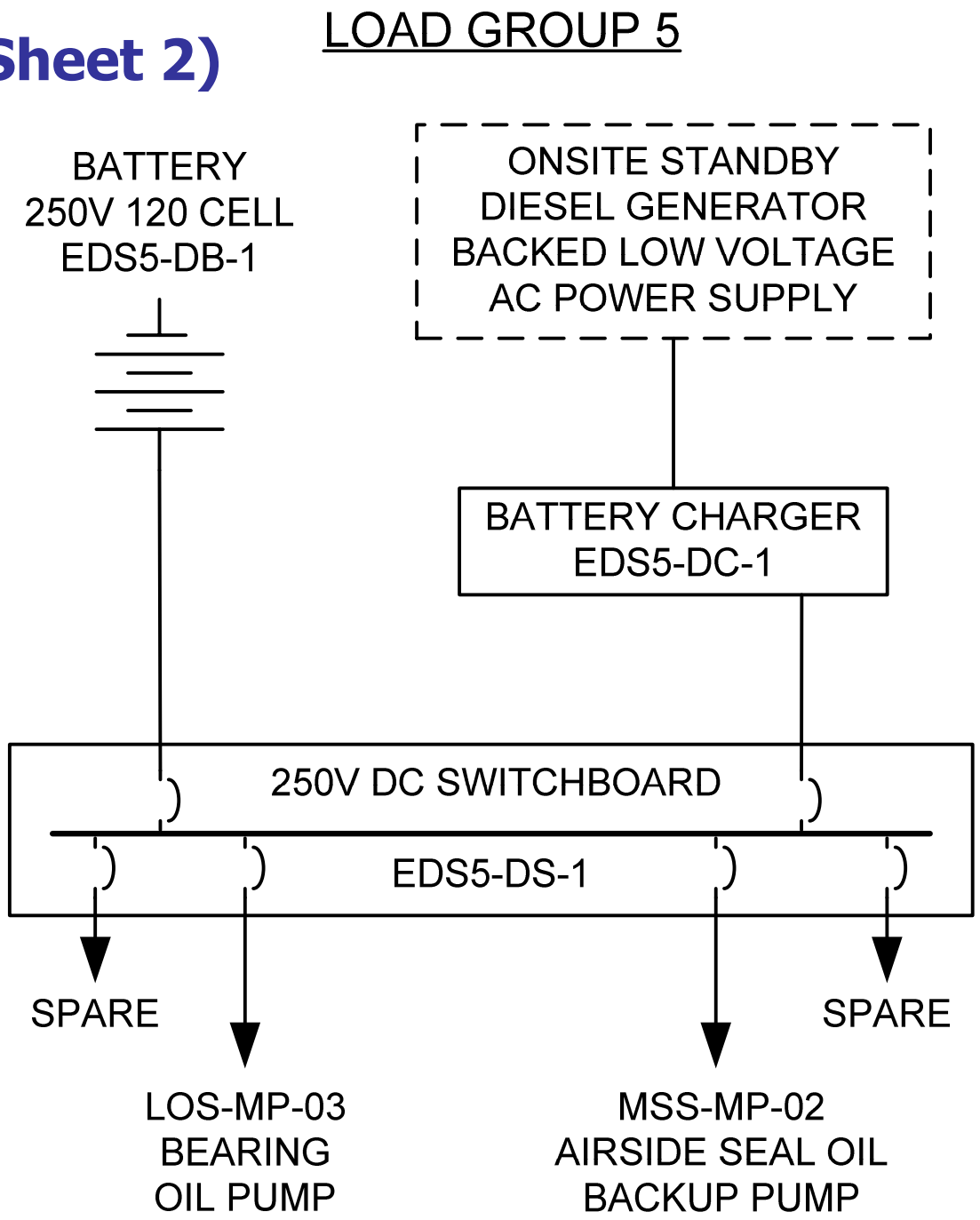


Fig. 9-5 (Sheet 1)

Fig. 9-5 (Sheet 2)



Class 1E DC & UPS System

- 24-hour battery banks (4), provide power for loads required for the first 24 hours following a loss of all ac power concurrent with a DBA.
- 72-hour battery banks (2), is used for loads required for 72 hours following the same event.
- Spare battery bank with charger is provided for the Class 1E dc and UPS system.
- Class 1E UPS provides 120 Vac to four independent divisions of Class 1E I&C power buses.

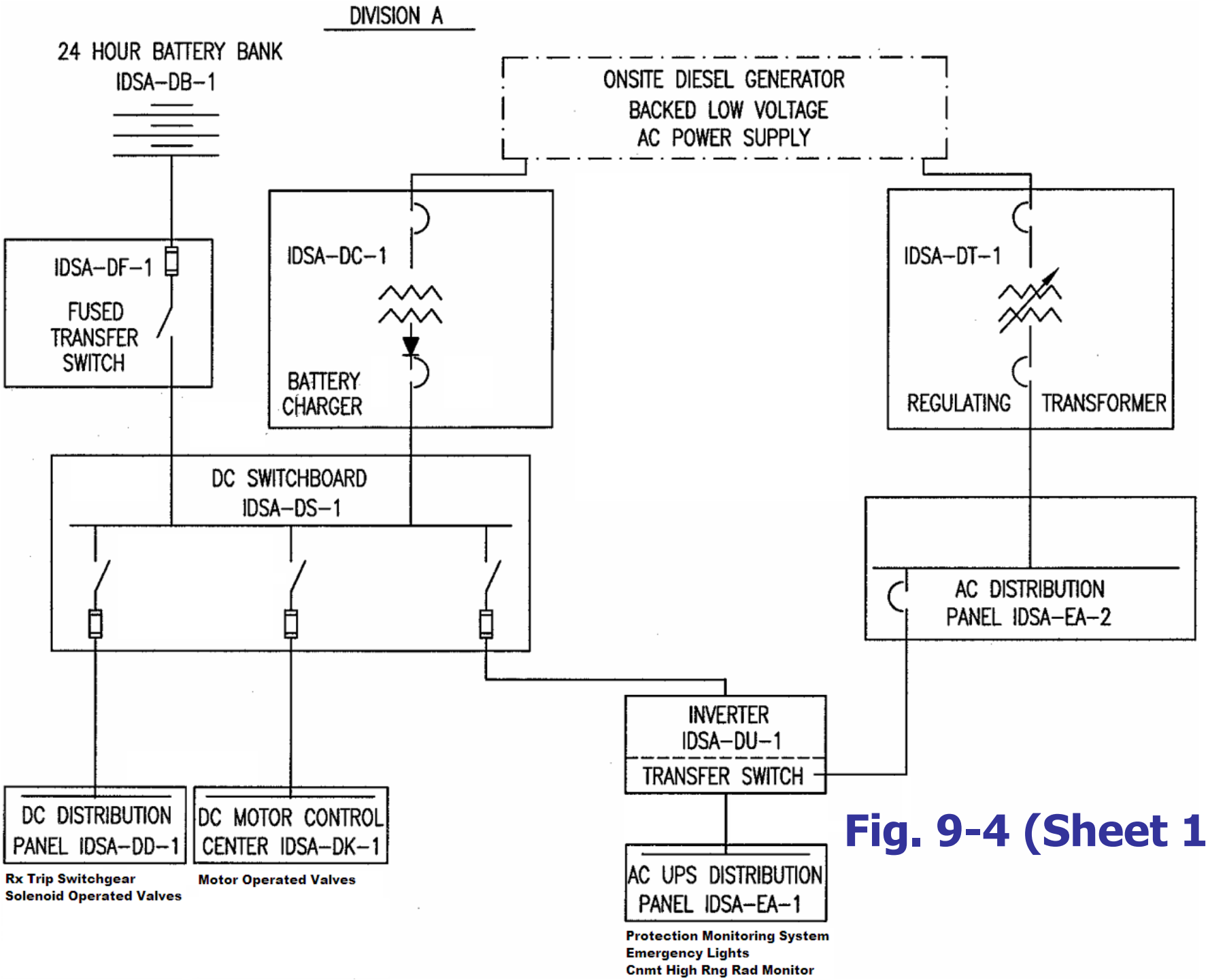


Fig. 9-4 (Sheet 1)

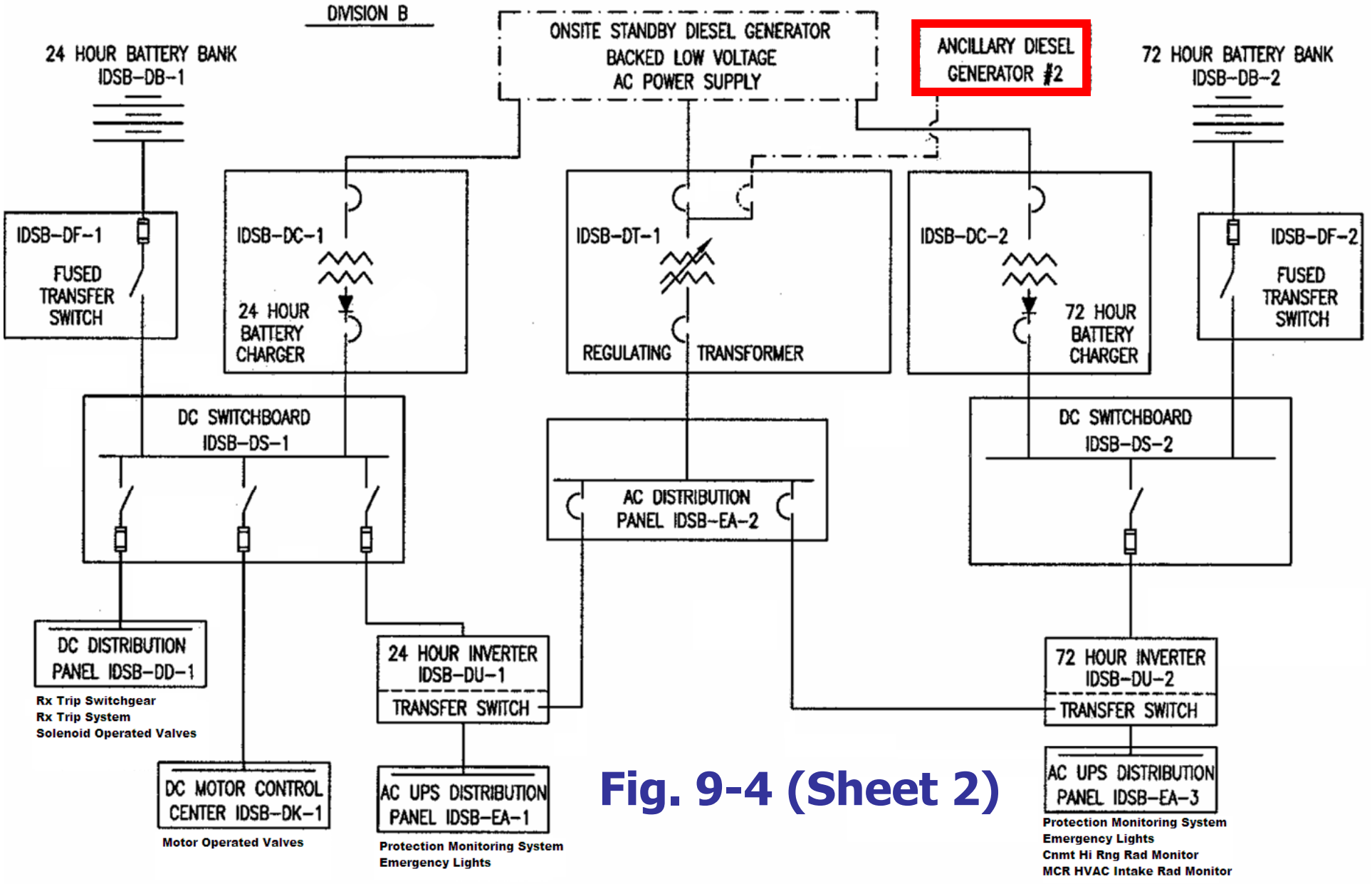


Fig. 9-4 (Sheet 2)

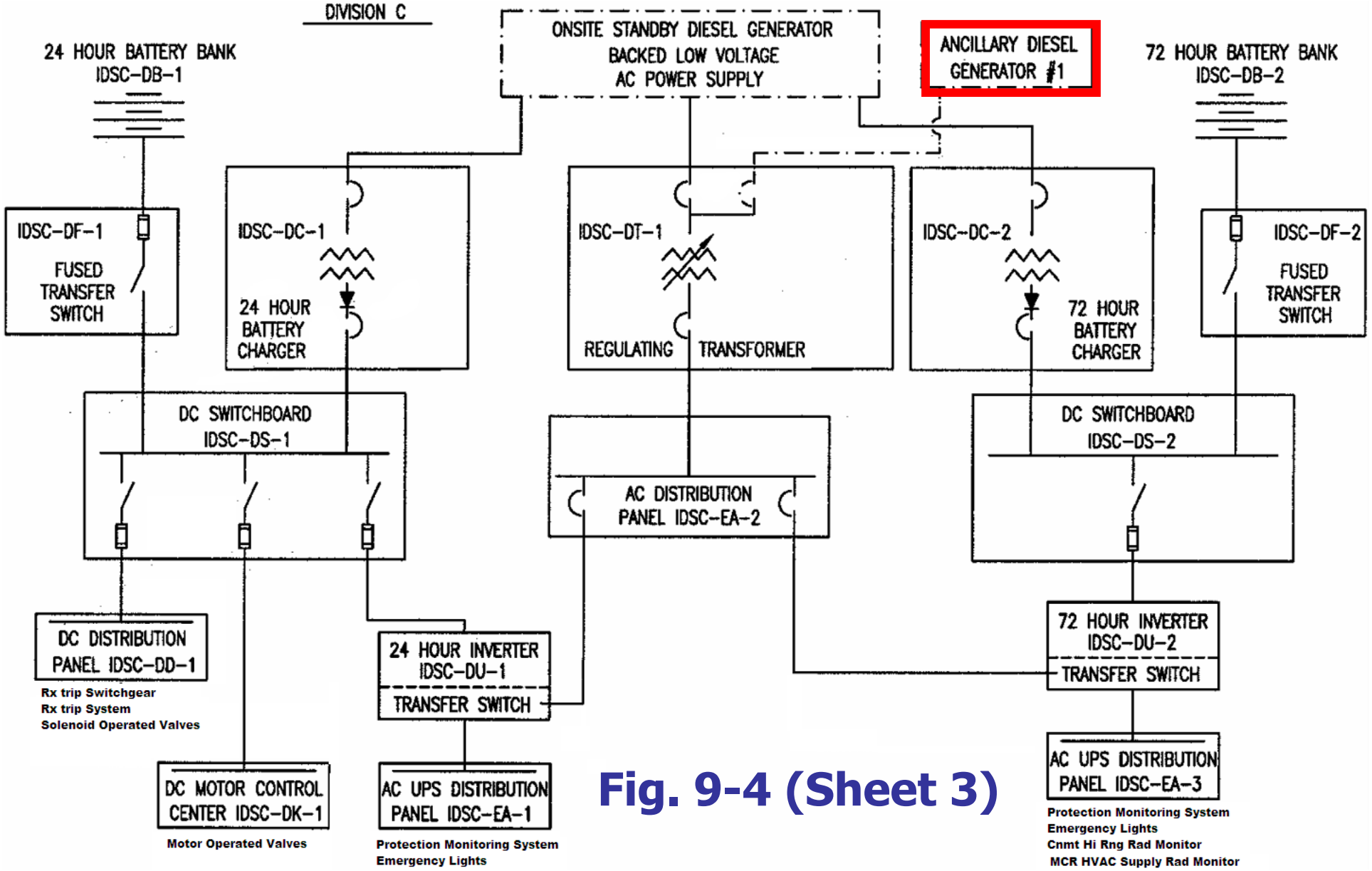


Fig. 9-4 (Sheet 3)

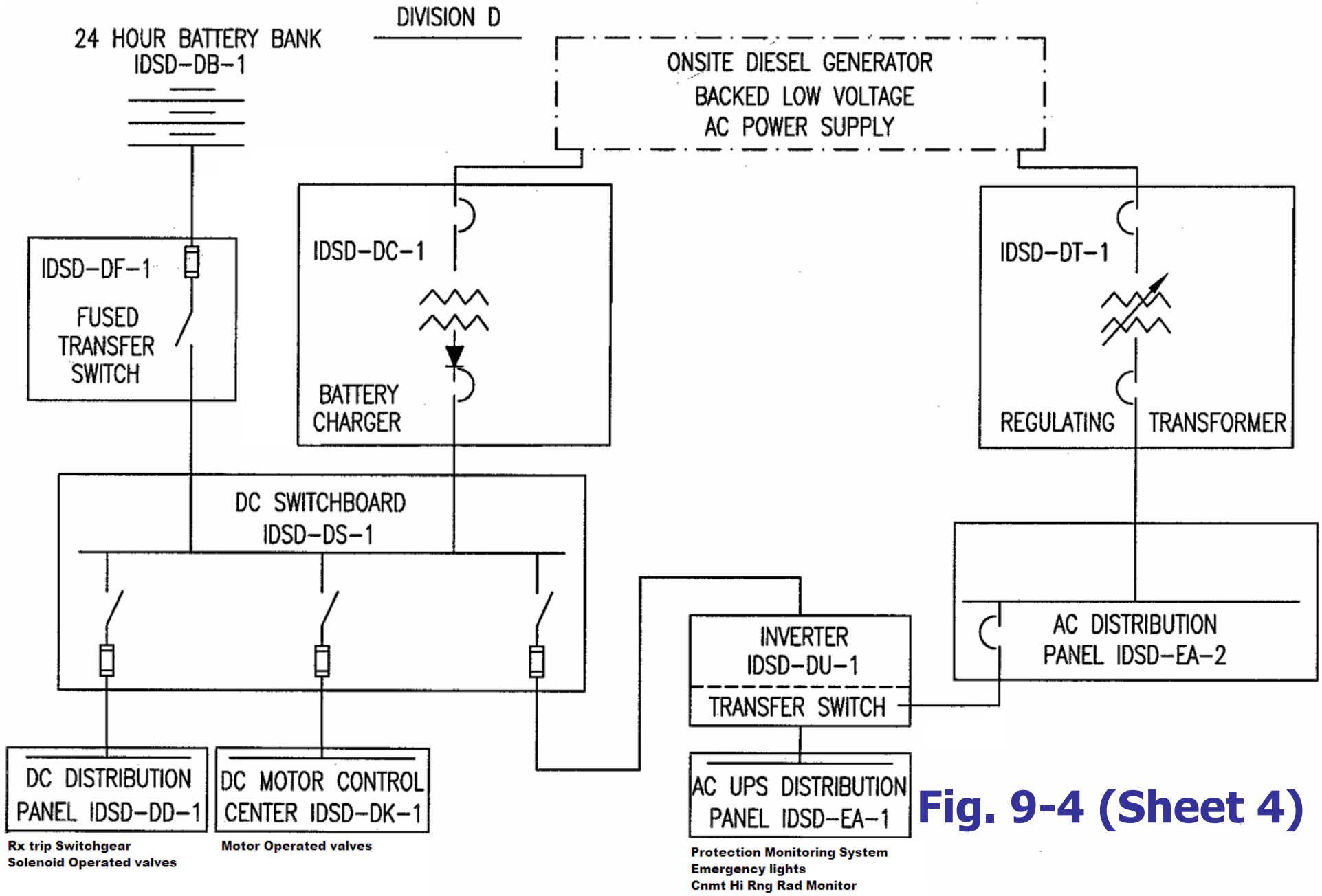


Fig. 9-4 (Sheet 4)

Questions?

Which of the following are Class 1E components of the AP1000 plant electrical systems?

a. 2-hour battery banks

b. 72-hour battery banks

c. Standby AC diesel generators

d. Ancillary AC diesel generators

The ancillary DGs are not needed for the first _____ hours following a loss of all other ac sources.

a. 2

b. 24

c. 48

d. 72