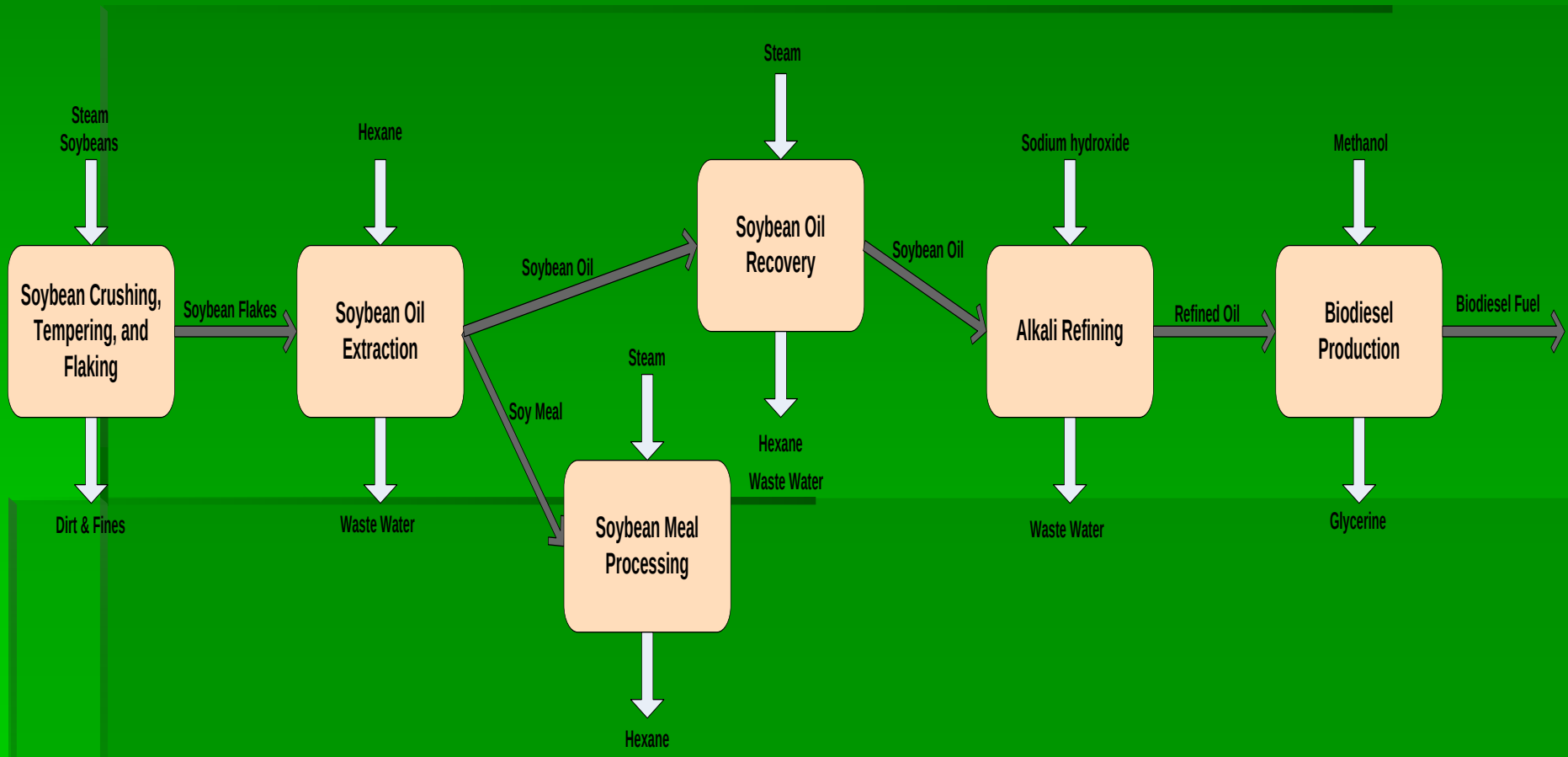
BIODIESEL MANUFACTURING FACILITY RESPONSE OVERVIEW

Description of Biodiesel Fuel and the Biodiesel Production Process



Major Chemicals Involved in Biodiesel Production

- Soybean hulls and fines
- Hexane – extracts soybean oil
- Sodium and Potassium Hydroxide – removes fatty acids from soybean oil
- Methanol – replaces glycerol in soybean oil to make oil less viscous (transesterification)
- Glycerol – byproduct of transesterification
- Fuel for process heat (i.e. natural gas, propane, etc.)

Appropriate Mitigation Measures for Release of Biodiesel Fuel

- **Proper Air Monitoring Equipment**
  - Biodiesel fuel has a very low volatility at normal ambient temperatures and vapors are not typically an issue. However, vapors/mists may be generated when heated above ~266 degrees Fahrenheit (°F).
- **Proper Spill Containment**
  - Containment/response should follow typical oil containment procedures. Example: use oil-dry, petroleum-compatible absorbent socks, booms, etc; the absorbent material used should be resistant to alcohol in the event methanol has further commingled with the biodiesel release. Disposal of biodiesel-contaminated soil or products can be considered non-hazardous provided methanol and/or hexane have not commingled with the release to meet the flammability characteristic for hazardous waste.

Note: The Response Overview includes measures for the other major chemicals involved in the manufacturing process.

EXPECTED FATE OF BIODIESEL

- **Release in Soil**
  -Biodegradation occurs rapidly, with faster rates under aerobic conditions than anaerobic conditions.
- **Release in Water**
  -Insoluble in water. Degrades rapidly and fairly extensively in aquatic environments. Estimated to degrade at a rate approximately four times faster than petroleum diesel – 85% of pure biodiesel expected to degrade within 28 days.
- **Release in Air as result of spill/fire**
  -Combustion produces carbon monoxide, carbon dioxide along with thick smoke.
- **Release to storm/sanitary sewers**
  -May be high in free fatty acids and glycerol, and can have a high biochemical oxygen demand (BOD). These can disrupt wastewater treatment plant operations.

Overall Health Risks of a Biodiesel Release

- **Human Health Effects**
  - Inhalation effects are negligible unless heated to produce vapors.
  - If biodiesel fuel were to be ingested, enzymes in the body called esterases would break the biodiesel fuel molecules into the component fatty acids and alcohol molecules. The alcohol is usually methanol and methanol is toxic. Thus, methanol toxicity could be a concern for ingestion of biodiesel fuel.
  - Neat biodiesel fuel is approximately 11 percent methanol by weight, so ingestion of 100 grams of biodiesel would release 11 grams, or 14 milliliters (mL) of methanol. For a 70 kilogram (kg) adult, the fatal dose of methanol ranges from 60 to 160 mL.
- **Ecological Effects**
  - Biodiesel biodegrades much more rapidly than conventional diesel.
  - When biodiesel is present in bulk in the environment, it can coat animals that come in contact with it and may reduce the ability of oxygen to reach aquatic systems. In this respect, its action is similar to petroleum diesel fuel.
  - Biodiesel does not have the toxicity and the solvent action that diesel fuel has, so its effects on animals are expected to be less severe.
  - The treatment of oiled birds and animals would be similar to the treatment provided when an oil spill occurs.

The following are Federal regulations that would apply to biodiesel manufacturing facilities when they meet the thresholds for the requirements of the regulation. Note that state-specific regulations may also apply

- Emergency Planning and Community Right Know ACT (EPCRA)
- U.S. EPA Oil Pollution Control/Federal Water Pollution Control Act
- Clean Water Act
- Oil Pollution Act of 1990 (OPA 90)
- Resource Conservation and Recovery Act (RCRA)
- Clean Air Act (CAA)
- DOT Hazardous Materials Regulations (HMR); as amended by Homeland Security Act of 2002

Current Biodiesel Plants