APPENDIX B
HAZARDOUS SUBSTANCES MANAGEMENT PLAN

INTRODUCTION

Anadarko Petroleum Corporation (Anadarko); Chandler and Associates LLC (Chandler); and Texaco Exploration and Production, Inc. (Texaco) propose to explore and develop natural gas reserves in two separate areas northeast and southwest of Price, Utah totaling about 111,520 acres. Also, Questar Pipeline Company proposes to construct a natural gas transmission pipeline in a 27-mile long corridor that encompasses 261 acres, which brings the total area encompassed by the Proposed Action to 111,781 acres. The Bureau of Land Management (BLM) has prepared an Environmental Impact Statement (EIS) for the proposed project and this Hazardous Substances Management Plan (HSMP), which is included as an appendix to the EIS, provides specific information regarding the types and quantities of hazardous and extremely hazardous substances the Companies expect to produce or use for the project. Detailed descriptions of the proposed action and alternatives, the potential environmental consequences, and proposed mitigation and monitoring measures are provided in the EIS.

This HSMP is provided pursuant to BLM Instruction Memoranda, which require that all National Environmental Policy Act (NEPA) documents list and describe any hazardous and/or extremely hazardous substances that would be produced, used, stored, transported, or disposed of as a result of a proposed project. Hazardous substances, as defined herein, are those substances listed in the Environmental Protection Agency's (EPA's) *Consolidated List of Chemicals Subject to Reporting Under Title III of the Superfund Amendments and Reauthorization Act (SARA) of 1986*. Extremely hazardous substances are those identified in the EPA's *List of Extremely Hazardous Substances* (40 Code of Federal Regulations 355). The Companies have reviewed these lists and substances included on either list that could be present in any amount over the life of the proposed project are listed and/or discussed in this appendix.

Some potentially hazardous substances that may be used in small, unquantifiable amounts have been excluded from this HSMP. These substances may include: wastes, as defined by the Solid Waste Disposal Act, wood products, manufactured items and articles that do not release or otherwise result in exposure to a hazardous substance under normal conditions of use (e.g., steel structures, automobiles, and tires), food, drugs, tobacco products, and other miscellaneous substances (e.g., WD–40, gasket sealants, and glues). No unauthorized use or disposal of these substances by project personnel would occur during implementation of the project. Additionally, all project personnel would be directed to properly dispose of these substances in an appropriate manner. Solid wastes generated at well sites would be collected in approved waste containers (e.g., trash baskets or dumpsters) and each well site would be provided with one or more such containers during drilling and completion. Solid wastes would be regularly removed from well sites and transported off the Project Area to approved disposal facilities.

HAZARDOUS SUBSTANCES

A list of all relevant known hazardous and extremely hazardous substances that may be used, produced, stored, or disposed of during implementation of the project is provided herein. Where possible, the quantities

of these substances have been estimated on a per-well basis and their use, storage, and disposal methods described.

PRODUCTION PRODUCTS

The purpose of the proposed project is to extract natural gas from the Ferron Sandstone Member of the Mancos Formation. Water also would be produced as a byproduct of gas extraction operations. **Table B–1** lists and quantifies, where possible, the hazardous and extremely hazardous substances that may be found in these production products.

Storage of production products is not expected to occur. As natural gas and produced water are brought to the surface, they would be separated and discharged into the respective pipelines for transport to the CPF. From here, the natural gas would be transported to the transmission pipeline. The produced water would be discharged into a disposal well. Thus, neither product would be stored.

Natural Gas

Natural gas primarily containing methane would be produced from almost 350 wells at rates of up to a million cubic feet per day (mmcfd). No extremely hazardous substances are anticipated to be produced with the gas stream. Although the hazardous substance hexane (CAS Number 110–54–3) would be present in the gas stream, it would be present at concentrations well below those that would be of regulatory concern (**Table B–1**). In addition, the gas would likely contain small amounts of potentially-hazardous polycyclic organic matter and polynuclear aromatic hydrocarbons. No other hazardous substances are known to occur in the natural gas stream.

The gas produced from the Ferron Natural Gas Project would be transported from each location through newly-constructed pipelines linking wells to existing or newly-constructed gas production facilities. Ultimately, the natural gas would be delivered to consumers for combustion. Small quantities of natural gas may be vented or flared into a flare pit pursuant to BLM's rules and regulations (Notice to Lessees [NTL]–4A) and UDOGM's rules and regulations. BLM's approval would be obtained before flaring or venting operations. No natural gas storage is anticipated.

Industry standard pipeline equipment, materials, techniques, and procedures in conformance with all applicable regulatory requirements would be employed during construction, testing, operation, and maintenance of the project to ensure pipeline safety and efficiency. All necessary authorizing actions for natural gas pipelines would be addressed before installation. These actions include:

- Carbon County and Emery County special use permits,
- BLM rights-of-way (ROWs) applications, and
- Conformance with U.S. Department of Transportation (DOT) pipeline regulations (49 CFR 191–192).

Produced Water

Initially, produced water from the Ferron Natural Gas Project's wells is expected to average about 350 barrels per day for most wells (**Table B–1**). The quality of produced water from the wells would vary and would be monitored periodically. Based on analyses of samples, no hazardous substances. are known to be present in the produced water. However, hydrogen sulfide, an extremely hazardous substance, occurs in

Table B–1
Hazardous and Extremely Hazardous Materials Potentially Produced by the Ferron Natural Gas Project

Production Product	Hazardous Constituents[1]	Extremely Hazardous Constituents[2]	Quantity Produced per Well[3]
Natural Gas		None	
	Hexane		0.05 percent Reportable quantity = 5,000 lbs.)
Produced Water			350 barrels per day
		Hydrogen Sulfide	11 ppm

Notes:
1. The hazardous constituents listed, are to the best of our present knowledge, those that are or may be present in the production products and are listed under the Environmental Protection Agency's *Consolidated List of Chemicals Subject to Reporting Under Title III of the Superfund Amendments and Reauthorization Act (SARA) of 1986*, as amended.
2. Extremely hazardous materials are those defined in 40 CFR 355.
3. mmcfd = million cubic feet per day, gpd = gallons per day, percent = percent by volume, ppm = parts per million

Sources: Cox, 1998; Schlotterback, 1998.

small amounts (80–90 ppm below the minimum level of 100 ppm at which it is regulated under Onshore Order No. 6).

Produced water would be piped from the wells to central production facilities for disposal in the Navajo Formation. All necessary authorizing actions would be met before disposal of the produced water.

CONSTRUCTION, DRILLING, PRODUCTION, AND RECLAMATION

Known hazardous or extremely hazardous substances that may be used during construction, drilling, production, and reclamation operations for the Ferron Natural Gas Project are listed at the end of this appendix. Hazardous or extremely hazardous substances used during typical project implementation fall into one of seven categories. They are fuels, lubricants, coolant/antifreeze and heat transfer agents, drilling fluid additives, fracturing fluids, cement and additives, and miscellaneous materials. These categories of substances are described in more detail below.

Storage of materials used for construction, drilling, production, and reclamation would depend upon the material. Materials for construction and drilling would be brought in by drillers, used relatively quickly, and stored on site for only a comparatively short time. Materials used by the Companies for production would be stored at the Companies' facilities.

Fuels

Gasoline (CAS 8006–61–9), diesel fuel (CAS 68476–30–2), and natural gas are the fuels proposed for use on the project. All contain substances deemed hazardous. Gasoline would be used to power vehicles providing transportation to and from the Project Area. Diesel fuel would be used to power transport vehicles,

drilling rigs, and construction equipment and would be a component of fracturing fluids. Natural gas would be used to power pipeline compressors.

Gasoline

Gasoline would be used to power vehicles traveling to, from, and within the Project Area. The hazardous substances present in gasoline include benzene (CAS 71–43–2), toluene (CAS 108–88–3), ethylbenzene (CAS 100–41–4), xylene (CAS 130–02–07), m-xylene (CAS 108–38–3), o-xylene (CAS 95–47–6), methyl tert-butyl ether (CAS 1634–04–4), polynuclear aromatic hydrocarbons, and polycyclic organic matter.

Gasoline would be purchased from regional venders and would primarily be stored and transported in vehicle gas tanks. Some additional gasoline storage may be provided in appropriately-designed and labeled 1 to 5-gallon containers for supplemental use as vehicle fuel. Gasoline would be used exclusively as a fuel for transport vehicles, being burned in internal combustion engines. No large-scale storage of gasoline is anticipated.

Diesel Fuel

Diesel fuel for vehicles would be used, transported, and stored as described above under gasoline. Additional diesel fuel would be used to power drilling rigs, workover rigs, and road maintenance and reclamation equipment. Diesel fuel also would be used as a minor fracturing fluid constituent.

Diesel fuel primarily consists of hydrocarbons containing from 15 to 25 carbons. It may contain hazardous substances, including benzene, toluene, ethylbenzene, p-xylene, m-xylene, o-xylene, methyl tert-butyl ether, naphthalene, polynuclear aromatic hydrocarbons, and polycyclic organic matter. No extremely hazardous substances are known to be present in diesel fuel.

During drilling operations, each well site would have an aboveground storage tank containing diesel fuel. These tanks would be filled as needed by a qualified, licensed fuel supplier. The use, transport, and storage of diesel fuel would be conducted according to all relevant state and federal rules, regulations, and guidelines.

Natural Gas

An unknown volume of natural gas would be burned to provide power for the natural gas compressors required for efficient functioning of the pipelines. The natural gas used to power compressors would be produced by the Ferron Natural Gas Project. The only hazardous substance identified in natural gas from the Ferron is hexane. Further details on the transportation of natural gas as a result of the proposed project and the relevant authorizing actions are discussed above.

Lubricants

Various lubricants, including motor oils, hydraulic oils, transmission oils, compressor lube oils, and greases, would be used for project-required vehicles, rigs, compressors, and other machinery. Some of these lubricants would likely contain polynuclear aromatic hydrocarbons and polycyclic organic matter. Also, some may contain compounds of lead, cadmium, nickel, copper, manganese, barium, zinc, and/or lithium. No extremely hazardous substances are known to be present in the lubricants required for the proposed project.

The exact quantity of each lubricant stored, transported, and disposed of is unknown. However, all lubricants would be used, stored, transported, and disposed of following manufacturer's guidelines. No unauthorized disposal of lubricants (e.g., disposal of used motor oil) would occur in connection with the project.

Coolant/Antifreeze and Heat Transfer Agents

Ethylene glycol (CAS 107–21–1) and triethylene glycol (CAS 112–27–6) would be utilized as coolant/antifreeze and heat transfer agents in association with this project. Ethylene glycol would be used as an engine coolant/antifreeze in automobiles, construction equipment, gas dehydrators, and drilling and workover rigs. An unspecified volume of this substance would be stored and transported in engine radiators. In addition, both ethylene glycol and triethylene glycol would be used as heat transfer fluids during well completion and maintenance operations. While the exact total volume of ethylene glycol to be used, stored, transported, and disposed of for the proposed project is unknown, any disposal of ethylene glycol and/or triethylene glycol would be conducted in accordance with all relevant federal and state rules and regulations.

Drilling Fluids and Additives

Fresh water would be used for drilling the disposal wells. Drilling fluids consist of clays and other additives that are used in standard industry procedures. All drilling operations would be conducted in compliance with applicable BLM rules and regulations.

All known hazardous substances that may be present in the proposed drilling fluids and additives are listed at the end of this appendix. No extremely hazardous substances are known to be present in any of the drilling fluids and additives.

Drilling fluid additives would be transported to well locations during drilling operations in appropriate sacks and containers in compliance with DOT regulations. Water-based drilling fluids, cuttings, and water would be stored in reserve pits and pits would be fenced to protect wildlife from exposure.

When the reserve pit is no longer required, its contents would be evaporated and the pit backfilled, as approved by the BLM. If necessary under special, unanticipated circumstances, reserve pit contents would be removed and disposed of at an appropriate facility in accordance with all relevant state and federal regulations.

Fracturing Fluids

Hydraulic fracturing is expected to be performed at many Ferron wells to augment gas flow rates. The hazardous substances present in fracturing fluid components are listed at the end of this appendix. No extremely hazardous substances are known to be present in any of the fracturing fluid additives.

Fracturing fluids and additives would be transported to well locations in bulk or in appropriately designed and labeled containers. All transportation of fracturing fluids and additives would be in adherence with DOT rules and regulations.

During fracturing, fluids are pumped under pressure down the well bore and out through perforations in the casing into the formation. The pressurized fluid enters the formation and induces hydraulic fractures. When the pressure is released at the surface, a portion of the fracturing fluids would be forced to the well bore and up into a tank or pit. The fracturing fluids would then be transferred to reserve pits and evaporated, or hauled

away form the location and reused or disposed of at an authorized facility. Decisions regarding the appropriate disposal of fracturing fluids would be made by the BLM or UDOGM on a case-by-case basis.

Cement and Additives

Well completion and abandonment operations would entail cementing and plugging various segments of the well bore to protect freshwater aquifers and other down-hole resources. Materials potentially used for cementing operations include: cement, calcium hydroxide, calcium chloride, pozzlans, sodium bicarbonate, and potassium chloride. An unknown quantity of cement and additives, which may contain the hazardous material classes of fine mineral fibers, polycyclic organic matter, and polynuclear aromatic hydrocarbons, would be transported in bulk to each well site by a qualified cement supply company. Small quantities may be transported and stored on-site in 50 pound sacks. Wells would be cased and cemented as directed and approved by the BLM (for federal minerals) and UDOGM (for state and patented minerals). No extremely hazardous substances are known to be present in the cement and additives proposed for use on this project.

Amine Fluids

Amine plants would be used to remove excess carbon dioxide from the wellhead gas stream. Amine fluid (methyldiethanolamine, CAS# 000105–59–9) would be used in a 50/50 ratio with water. The process would start in a gas stripping tower where the amine fluid would be contacted with the natural gas flow. The amine fluid would strip the carbon dioxide from the gas stream , the gas stream would flow to the transmission pipeline, and the amine fluid, with the carbon dioxide in solution, would then be transferred to the amine stripper. At this point, the solution would be heated, the carbon dioxide vented off and small amounts of amine gas would be vented, and the amine fluid would be circulated back to the gas stripper until the amine fluid is spent.

The Companies would store the amine fluid and water in 13,000-gallon tanks. The monthly usage would average approximately 300 gallons per month. Therefore, the total consumption would be 3,600 gallons per month for the 12 amine units proposed for the Ferron Natural Gas Project. The spent amine fluid would be stored in barrels and then transported to an approved disposal site.

Miscellaneous Materials

Miscellaneous materials, potentially containing hazardous and/or extremely hazardous substances which may be used for the proposed project include methanol and corrosion inhibitors. These substances would be transported to the site by qualified service and supply companies and would be used and disposed of following manufacturer's guidelines.

An unknown quantity of methanol (CAS 67–56–1) would be used to de-ice well bores and as a hydrate preventer during completion and natural gas transport operations. Methanol is a listed hazardous chemical and would be stored, transported, used, and disposed of in adherence with all applicable federal and state rules, regulations, and guidelines.

Combustion Emissions

Combustion emissions from gasoline and diesel engines, as well as flaring natural gas, will occur as a result of this project. The complete oxidation of hydrocarbon fuels yields only carbon dioxide and water as

combustion products; however, complete combustion is seldom achieved. Unburned hydrocarbons, particulate matter (e.g., carbon, metallic ash), carbon monoxide, nitrogen oxides, and possibly sulfur oxides would be expected as direct exhaust contaminants. Secondary contaminants would likely include the formation of ozone from the photolysis of nitrogen oxides. A listing of the hazardous and extremely hazardous substances potentially present in combustion emissions is provided in **Table B–2**.

Table B–2
Hazardous and Extremely Hazardous Materials Potentially Present in Combustion Emissions of the Ferron Natural Gas Project

Emission	Hazardous Constituents[1]	Extremely Hazardous Constituents[2]
Hydrocarbons	—	None
	PAHs[3]	
Particulate Matter	—	None
	Lead	
	Cadmium	
	Nickel	
	Copper	
	Manganese	
	Barium	
	Zinc	
	Lithium	
Gases	—	—
	Nitrogen dioxide	Nitrogen dioxide
	Sulfur dioxide	Sulfur dioxide
	Sulfur trioxide	Sulfur trioxide
	Ozone	Ozone

Notes:
1. The hazardous constituents listed are, to the best of our present knowledge, those that are or may be present in the production products and are listed under the EPA's Consolidated List of Chemicals Subject to reporting Under Title III of the Superfund Amendments and Reauthorization Act (SARA) of 1986, as amended.
2. Extremely hazardous materials are those defined in 40 CFR 355.
3. PAHs = polynuclear aromatic hydrocarbons.

Unburned hydrocarbons may contain potentially hazardous polynuclear aromatic hydrocarbons, and particulate matter may contain metal-based particulates from metallic lubricating oil additives and engine wear particulates. Hazardous substances in the particulate matter may therefore include compounds of lead, cadmium, nickel, copper, manganese, barium, zinc, and/or lithium.

Nitrogen dioxide (CAS 10102–44–0), sulfur dioxide (CAS 7446–09–5), sulfur trioxide (CAS 7446–11–9) and ozone (CAS 10028–15–6) are probable combustion emissions, all classified as extremely hazardous substances in large quantities and are analyzed in the air quality section of Chapter 4. These substances would be either directly released in minor quantities from internal combustion engines, or would be formed in the combustion of natural gas that would fuel the compressors. No releases of these or other materials would occur in excess of those allowed for Prevention of Significant Deterioration Class II areas. Also, releases would not occur that jeopardize National Ambient Air Quality Standards for the Project Area. Particulate matter emissions and larger unburned hydrocarbons would eventually settle out on the ground

surface, whereas gaseous emissions would react with other air constituents as components of the nitrogen, sulfur, and carbon cycles.

Management Policy and Procedure

The Companies and their contractors would ensure that all production, use, storage and disposal of hazardous and extremely hazardous substances as a result of the proposed project would be in strict accordance with all applicable existing, or hereafter promulgated federal, state, and local government rules, regulations, and guidelines. All project-related activities involving the production, use, storage and/or disposal of hazardous or extremely hazardous substances would be conducted in such a manner as to minimize potential environmental impacts.

The Companies would comply with emergency reporting requirements for releases of hazardous substances. Any release of hazardous or extremely hazardous substances in excess of the reportable quantity, as established in 40 CFR 117, would be reported as required by the *Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)* of 1980, as amended. The substances for which such notification must be given are the extremely hazardous substances listed under the *Emergency Planning and Community Right to Know* Section 302 and the hazardous substances designated under Section 1102 of CERCLA, as amended. If a reportable quantity of a hazardous or extremely hazardous substance is released, prompt notice of the release would be given to the BLM's Authorized Officer and all other appropriate federal and state agencies. Additionally, notice of any spill or leakage (i.e., undesirable event), as defined in BLM NTL–3A, would be given by the operators to the Authorized Officer and other such federal and state officials as required by law.

The Companies have evaluated field operations in the project area and have prepared or would prepare and implement plans and/or policies to ensure environmental protection from hazardous and extremely hazardous substances. These plans/policies include, where applicable:

- spill response plans;
- inventories of hazardous chemical categories pursuant to Section 312 of the SARA, as amended; and
- emergency plans.

Development operations in the Project Area would be in compliance with regulations promulgated under the Resource Conservation and Recovery Act (RCRA), Federal Water Pollution Control Act (Clean Water Act), Safe Drinking Water Act (SWDA), Toxic Substances Control Act (TSCA), Occupational Safety and Health Act (OSHA), and the Federal Clean Air Act (CAA). In addition, project operations would also comply with all attendant state rules and regulations relating to hazardous substance reporting, management, and disposal. **Table B–3** lists potential hazardous chemical categories for the oil and gas industry.

Table B–3
Generic List of Hazardous Chemical Categories for the Oil and Gas Exploration and Production Industry

Hazardous Chemical Category (with examples of representative chemicals)	Physical and Health Hazards	Approx. Quantity Onsite (BBLS, unless noted otherwise)
Acids	Immediate (Acute)	10–50
Hydrochloric acid (<30%)(CAS#7647–01–0)		
Alkalinity and pH Control Materials	Immediate (Acute)	500–1,000 lbs.
Calcium hydroxide (CAS#1305–62–0)		
Potassium hydroxide (CAS#1310–58–3)		
Soda ash (CAS#497–19–8)		
Sodium bicarbonate (CAS#144–55–8)		
Sodium carbonate (CAS#497–19–8)		
Sodium hydroxide (CAS#1310–73–2)		
Biocides	Immediate (Acute), Fire	2–20
Amines		
Glutaraldehyde (CAS#111–30–8)		
Isopropanol (CAS#67–63–0)		
Thiozolin		
Acrolein (CAS#107–02–8)	Fire, sudden release of pressure,	1–2
Anhydrous ammonia	Immediate (Acute)	1–2
Formaldehyde	Sudden release of pressure, Immediate (Acute), Fire, Immediate (Acute), Delayed (Chronic)	2–20
Breakers	Immediate (Acute), fire	0–500 lbs
Ammonium persulfate (CAS#7727–54–0)		
Benzoic acid (CAS#65–85–0)		
Enzyme		
Sodium acetate (CAS#127–09–3)		
Sodium persulfate (CAS#7772–27–1)		
Buffers	Immediate (Acute)	500–1000
Sodium acetate (CAS#127–09–3)		
Sodium bicarbonate (CAS#144–55–8)		
Sodium carbonate (CAS#497–119–8)		
Sodium deacetate		
Carbon Dioxide Removal Materials	Immediate (Acute)	13,000 gallons
Methyldiethanolamine (CAS#000105–59–9)		
Calcium Compounds	Immediate (Acute)	1000–3000 lbs.
Calcium bromide (CAS#71626–99–8)		
Calcium hypochlorite (CAS #7778–54–3)		
Calcium oxide (CAS#1305–78–8)		
Gypsum (CAS#10101–41–4)		
Lime (CAS#1305–78–8)		
Cement (CAS#65997–15–1)	Immediate (Acute)	1000–1500 lbs.

Table B–3 (continued)
Generic List of Hazardous Chemical Categories for the Oil and Gas Exploration and Production Industry

Hazardous Chemical Category (with examples of representative chemicals)	Physical and Health Hazards	Approx. Quantity Onsite (BBLS, unless noted otherwise)
Cement Additives – Accelerators Calcium chloride (CAS #10035–04–8) Gypsum (CAS#10101–41–4) Potassium chloride Sodium Chloride (CAS#7647–14–5) Sodium metasilcate	Immediate (Acute)	5000–20,000 lbs.
Cement Additives – Fluid Loss Cellulose polymer Latex	Immediate (Acute)	50–1000 lbs.
Cement Additives – Miscellaneous Cellulose flakes (CAS#9004–34–6) Coated aluminum Gilsonite (CAS#12002–43–6) Lime (CAS#1305–78–8) Long chain alcohols	Immediate (Acute)	0–500 lbs.
Cement Additives – Retarders Cellulose polymer Lignosulfonates	Immediate (Acute)	0–1000 lbs.
Cement Additives – Weight Modification Barite (CAS#7727–43–7) Bentonite Diatomatious earth (CAS#68855–54–9) Fly ash Glass beads Hematite (CAS#1317–60–8) Ilmenite Pozzoians	Immediate (Acute)	500–20,000 lbs.
Corrosion Inhibitors 4–4' Methylene dianiline (CAS#101–77–9) Acetylenic alcohols Amine Formulations Ammonium bisulfite (CAS#10192–30–0) Basic zinc carbonate (CAS#3486–35–9) Gelatin Ironite sponge (CAS#1309–37–1) Sodium chromate (CAS#7775–11–3) Sodium dichromate (CAS#10588–01–9) Sodium polyacrylate Zinc lignosulfonate Zinc oxide (CAS#1314–13–2)	Immediate (Acute), Delayed (chronic), Fire	2–20
Crosslinkers Boron Compounds Organo-metallic complexes	Immediate (Acute), Fire	300–500 lbs.

Table B–3 (continued)
Generic List of Hazardous Chemical Categories for the Oil and Gas Exploration and Production Industry

Hazardous Chemical Category (with examples of representative chemicals)	Physical and Health Hazards	Approx. Quantity Onsite (BBLS, unless noted otherwise)
Defoaming Agents Aluminum stearate Fatty acid salt formation Mixed alcohols Silicones	Immediate (Acute)	1–5
Deflocculants Acrylic polymer Calcium lignosulfonate Chrome-free lignosulfonate Chromium lignosulfonate Iron lignosulfonate Quebracho Sodium acid pyrophosphate (SAPP) Sodium hexametaphosphate (CAS#10124–56–8) Sodium phosphate (oilfos) Sodium tetraphosphate Styrene, maleaic anhydride co-polymer salt Sulfo-methylated tannin	Immediate (Acute)	500–1000 lbs.
Detergents/Foamers Amphoteric surfactant formulation Ethoxylated phenol Detergents	Immediate (Acute), Fire	2–20
Explosives Charged well jet perforating gun, Class C explosives Detonators; Class A explosives Explosive power device, Class B	Sudden release of pressure	0–100 lbs.

Table B–3 (continued)
Generic List of Hazardous Chemical Categories for the Oil and Gas Exploration and Production Industry

Hazardous Chemical Category (with examples of representative chemicals)	Physical and Health Hazards	Approx. Quantity Onsite (BBLS, unless noted otherwise)
Filtration Control Agents Acrylamide AMPS copolymer Aniline formaldehyde copolymer hydrochlorite Causticized leonardite Sulfomethylated phenol formaldehyde Leonardite Partially hydrolyzed polyacrylamide Polyalkonalamine ester Polyamine acrylate Polyanionic cellulose Potassium lignite Preserved starch Sodium carboxymethyl cellulose (CAS#9004–32–4) Starch (CAS#9005–25–8) Vinylsufonate copolymer	Immediate (Acute)	20–200
Friction Reducers Acrylamide methacrylate copolymers Sulfonates	Immediate (Acute)	2–20
Fuels Diesel (CAS#68476–34–6) Fuel oil Gasoline (CAS#8006–61–9) Kerosene (CAS#8008–20–6) Propane (CAS#74–98–6)	Immediate (Acute), Delayed (Chronic), Fire	200–400
Gelling Agents Cellulose and guar derivatives	Immediate (Acute)	1500–5000 lbs
Gel Stabilizers Sulfites Thiosulfates	Immediate (Acute)	1–2
Heat Transfer Fluids Ethylene Glycol (CAS #107–21–1) Freon	Immediate(Acute), Delayed (Chronic)	20–200
Herbicides	Immediate (Acute)	2–20
Hydraulic Fluids	Fire, Immediate (Acute)	2–20
Inert Gases Carbon Dioxide (CAS#124–38–9) Nitrogen (CAS#7727–37–9)	Immediate (Acute), Sudden release of pressure	0–400 tons

Table B–3 (continued)
Generic List of Hazardous Chemical Categories for the Oil and Gas Exploration and Production Industry

Hazardous Chemical Category (with examples of representative chemicals)	Physical and Health Hazards	Approx. Quantity Onsite (BBLS, unless noted otherwise)
Lost Circulation Materials Cane fibers Cedar fibers Cellophane fibers Corn cob Cottonseed hulls Mica (CAS#12001–26–2) Nut shells Paper Rock wool Sawdust	Immediate (Acute)	0–1000 lbs
Lubricants, Drilling Mud Additives Graphite (CAS#7782–42–5) Mineral oil formations Organo–fatty acid salt Vegetable oil formulations Walnut shells	Immediate (Acute)	2–20
Lubricants, Engine Motor oil Grease	Immediate (Acute)	2–20
Miscellaneous Drilling Additives Diatomaceous Earth (CAS#68855–54–9) Oxalic acid (CAS#144–62–7) Potassium acetate (CAS#127–08–2) Zinc bromide (CAS#7699–45–8)	Immediate (Acute), Delayed (Chronic)	100–500 lbs.
Odorants Mercaptans, aliphatic	Immediate (Acute)	0–1
Paint and Paint Thinner	Fire, Delayed (Chronic)	5–50 gals.
Pipe Joint Compound	Delayed (Chronic)	1–2 lbs.
Organic Acids Acetic acid (CAS#64–19–7) Acetic anhydride (CAS#108–24–7) Benzoic acid (CAS#65–85–0) Citric acid (CAS#5949–29–1) Formic acid (CAS#64–18–6) Organic acid salts	Immediate (Acute), Fire	2–20
Produced Hydrocarbons Condensate Crude oil (CAS#8002–05–9) Natural Gas	Immediate (Acute), Delayed (Chronic), Fire, Sudden release of pressure	2000–20,000

Table B–3 (continued)
Generic List of Hazardous Chemical Categories for the Oil and Gas Exploration and Production Industry

Hazardous Chemical Category (with examples of representative chemicals)	Physical and Health Hazards	Approx. Quantity Onsite (BBLS, unless noted otherwise)
Proppants Bauxite (CAS#1318–16–7) Resin coated sand Zirconium proppant	Immediate (Acute)	50,000–600,000 lbs.
Resin and Resin Solutions Melamine resins Phenolic resins Polyglocol resins	Immediate (Acute), Fire	1–2
Salt Solutions Aluminum chloride (CAS#7446–70–0) Ammonium chloride (CAS#12125–02–9) Calcium bromide (CAS#17626–99–8) Calcium chloride (CAS#10035–04–8) Calcium sulfate (CAS#778–18–9) Ferrous sulfate (CAS#7782–63–0) Potassium chloride (CAS#7447–40–7) Sodium chloride (CAS#7647–14–5) Sodium sulfate (CAS#7757–82–6) Zinc bromide (CAS#7699–45–8) Zinc chloride (CAS#7646–85–7) Zinc sulfate	Immediate (Acute)	2000–20,000
Scale Inhibitors Ethylenediaminetetraacetic acid (EDTA) (CAS#60–00–4) Inorganic phosphates Isopropanol (CAS#67–63–0) Nitrilotriacetic acid (NTA) (CAS#139–13–9) Organic phosphates Polyacrylate Polyphosphates	Immediate (Acute), Fire	20–200
Shale Control Additives Hydrolyzed polyacrylamide polymer Organo-aluminum complex Polyacrylate polymer Sulfonated asphaltic residuum	Immediate (Acute)	20–200
Silica	Immediate (Acute), Delayed (Chronic)	2000–20,000 lbs.

Table B–3 (continued)
Generic List of Hazardous Chemical Categories for the Oil and Gas Exploration and Production Industry

Hazardous Chemical Category (with examples of representative chemicals)	Physical and Health Hazards	Approx. Quantity Onsite (BBLS, unless noted otherwise)
Solvents 1,1,1–Trichloreoethane (CAS#71–55–6) Acetone (CAS#67–64–1) Aliphatic hydrocarbons Aromatic naphtha (CAS#8032–32–4) Carbon tetrachloride (CAS#56–23–5) Diacetone alcohol Ethylene glycol monobutyl ether (CAS#111–76–2) Kerosene (CAS#8008–20–6) Isopropanol (CAS#67–63–0) Methyl ethyl ketone (MEK) (CAS#78–98–3) Methyl isobutyl ketone (MIBK) (CAS#108–10–1) Methanol (CAS#67–56–1) t–Butyl alcohol (CAS#75–65–0) Toluene (CAS#108–88–3) Turpentine (CAS#8006–64–2) Xylene (CAS#1330–20–7)	Immediate (Acute), Delayed (Chronic), Fire	20–200
Spotting Fluids Nonoil base spotting fluid Oil base spotting fluid (diesel oil base) Oil base spotting fluid (mineral oil base) Sulfonated vegetable ester	Immediate (Acute), Fire	20–200
Surfacants – Corrosive Alcohol ether sulfates Amines Quarternary polyamine Sulfonic acids	Immediate (Acute)	2–20
Surfactants Ethylene Diamine (CAS#107–15–3)	Fire, Immediate (Acute)	2–20
Surfactants – Flammable Amines Ammonium salts Fatty alcohols Isopropanol (CAS#67–56–1) Oxylalkytated phenols Petroleum naphtha (CAS#8030–30–5) Sulfonates	Immediate (Acute), Fire	2–20
Surfactants – Miscellaneous Amine salts Glycols Phosphonates	Immediate (Acute)	2–20

Table B–3 (continued)
Generic List of Hazardous Chemical Categories for the Oil and Gas Exploration and Production Industry

Hazardous Chemical Category (with examples of representative chemicals)	Physical and Health Hazards	Approx. Quantity Onsite (BBLS, unless noted otherwise)
Temporary Blocking Agents Benzoic acid (CAS#65–85–0) Naphthalene (CAS#91–20–3) Petroleum wax polymers Sodium chloride (CAS#7647–14–5)	Immediate (Acute)	2–20
Tracers Ammonium Nitrate Potassium Nitrate	Fire	2–20