MEMORANDUM

SUBJECT: Request for Approval of a Consistency Exemption to the Statutory Two Million Dollar Limit for the Conduct of a Time Critical Removal Action at the Oklahoma Refining Company Site, Cyril, Caddo County, Oklahoma

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THRU: Charles A. Gazda, Chief Response and Prevention Branch (6SF-R)

TO: Myron O. Knudson, P.E., Director Superfund Division (6SF)

I. Purpose

The purpose of this memorandum is to request and document approval of a Time Critical Removal Action and exemption to the statutory two million dollar limit imposed by Section 104 (c) (1) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), 42 U.S.C. §9601 et seq. and §9604 (c) (1), for the Oklahoma Refining Company (ORC) site located on the Cyril, Caddo County, Oklahoma. The basis for the request for exemption from this statutory limitation is that the proposed action is necessary, otherwise appropriate, and consistent with future remedial actions to be taken at the site.

The objective of this proposed removal action is to remove or eliminate principal hazardous wastes, thereby eliminating or reducing risks from potential waste exposure pathways, at the site. The ORC site was placed on the Nation Priorities List (NPL) on February 21, 1990. However, the refinery process area (ORC North) was not considered in the Remedial Investigation (RI) and subsequent Remedial Action, since it was active and under Resource Conservation and Recovery Act (RCRA) enforcement at that time. The specific areas of ORC North to be addressed in this removal action are the: 1) Superstructures/refinery process units containing potential hazardous chemicals and substances; and 2) miscellaneous items, including above-ground storage tanks (ASTs), sumps, cooling towers and structurally unsafe buildings. The specific objectives for the Time Critical Removal Action, are: 1) To protect human health and the environment from the release of volatile organic compounds (VOCs) and toxic liquids from the refinery superstructure to air, soil, and ground water; 2) to protect human health from...
the release of damaged and friable asbestos containing material (ACM) from the refinery superstructure to air; and 3) to protect adjacent residents and motorists from the threat of fire and explosion from improperly stored chemicals at the site.

**Recommended Removal Action**

There is a potential threat to human health from the site through ingestion, dermal contact, or inhalation of over 70 hazardous chemicals potentially present at the site. See Attachment 1. These materials present both a cancer and non-cancer risk to human health. Toxic effects vary, ranging from minor skin and eye irritations to cancer, asphyxiation, and death. Some of the more hazardous chemicals that may be present are tetra-ethyl lead (TEL), hydrogen sulfide (H2S), benzene, hydrochloric acid (HCl), sulfuric acid, hydrofluoric acid (HF), arsenic, chromium, ammonia, and calcium hypochlorite.

The removal action will address the refinery superstructure and miscellaneous items. The refinery superstructure includes 75 towers, 237 process vessels, and 14 buildings located within the project area (including an HF unit and the remnants of a TEL building), two cooling towers and associated above-ground piping. Miscellaneous items include contents of collection basins of the cooling towers, sumps, ASTs outside the refinery superstructure, and structurally unsafe buildings. It is unknown whether the refinery was properly purged at shutdown in 1984 or after startup attempts in 1995, and chemicals may remain in the lines and vessels. The process vessels and piping will be purged of chemicals and the remaining refinery superstructure will be dismantled. Concurrently, friable ACM from pipes and vessels will be abated. The dismantling of the superstructure may include the use of explosives to control the fall of the large towers and vessels. Generated hazardous wastes will be loaded onto trucks and transported to an appropriate off-site disposal facility.

The total project cost ceiling will exceed the two million dollar statutory limit. Approval of this document constitutes a determination that the removal action proposed herein is necessary, otherwise appropriate, and consistent with the remedial actions to be taken, and grants a consistency waiver (exemption) to the two million dollar statutory limitation on removal actions.

This site meets the criteria for removal actions taken pursuant to Section 300.415 of the National Oil and Hazardous Substances Pollution Contingency Plan ("NCP"), 40 C.F.R. § 300.415. That is, it is clear from the information that the Environmental Protection Agency (EPA) has gathered, regarding the site, that a threat to public health or welfare or the environment exists and that EPA should take action to abate, prevent, minimize, stabilize, mitigate, or eliminate the release or the threat of release of hazardous substances. Additionally, petroleum wastes on-site from ASTs and oil-contaminated soils may be addressed by a removal action pursuant to the Clean Water Act ("CWA"), 33 U.S.C. 1321, et seq., as amended by the Oil Pollution Act of 1990 ("OPA"), and qualify for OPA funding (FPN #E036AA).
II. Site Conditions and Background

CERCLIS ID Number: OKD091598870
Category of Removal: Time Critical
Site ID Number: D9
National Significance: NPL Site

a. Site Description

1. Removal site evaluation

The site is an inactive refinery that operated from 1920 to 1984. From the 1920s, the refinery produced a variety of petroleum products that included gasoline, diesel, jet fuel, naphtha, heating oil, asphalt, and industrial solvents. The raw materials were received by pipeline, rail and surface transport, and included crude oil, tetraethyl lead, sulfuric acid, caustic soda and hydrofluoric acid.

The owners of ORC declared bankruptcy in September, 1984, and ceased operations. In 1987, the northern portion of the ORC site was sold to Cyril Petrochemical Company (CPC), and the southern portion of the site was abandoned. The abandoned property (referred to as ORC South) included the majority of surface wastes and the ground water discharges into Gladys Creek. This portion of the site was referred to Superfund in 1984 for removal/remedial assessment. The northern portion of the property, referred to as ORC North, included the CPC refinery process area and tank farm. The CPC attempted to reactivate part of the refinery but the refinery has been inactive since the last startup attempt in 1995. The RCRA program officially deferred ORC North (CPC refinery and tank farm) to Superfund in 2002. See Attachment 2.

A limited number of investigations were conducted at the ORC site prior to Superfund remedial activities, including:

- Stanley Engineering, Environmental Investigation, ORC, Cyril, Oklahoma, August 1985.
These investigations primarily focused on sampling of surface water, surface soil, sediment, and a limited number of drinking water supply wells and monitoring wells to determine waste sources and to gather background data for future site evaluation.

The ORC site was proposed for placement on the NPL on June 24, 1988, and subsequently placed on the NPL on February 21, 1990. Pursuant to a Cooperative Agreement with EPA, the Oklahoma Department of Environmental Quality (ODEQ) is the lead agency for remedial activities. In 1990, the RI identified the following 20 source areas on ORC South: lime soda storage pit; pump pits; old caustic storage pits; a spent lime soda trap; slop oil pits; an API separator; sludge traps; a creek that intercepts ground water flow; the north and south pond systems; old storage pits; buried acid pits; oil skimmer ponds; pitch pits; a land treatment area; a process sewer system; methyl phenol spill areas; diked areas surrounding storage tanks; Asphalt Pit No. 1; and an asphalt flow area. ORC North was not considered in the RI, since it was considered active and under RCRA enforcement at that time.

The sources addressed in the RI contained inorganic constituents, including metals (e.g., arsenic, barium, beryllium, lead, mercury, nickel, cadmium, chromium, copper and zinc), and organic compounds, including volatile organic contaminants (VOCs), polyaromatic hydrocarbons (PAHs), and phenolic compounds in various concentrations. The RI also identified ground water contamination in the upper Rush Springs Sandstone aquifer as being contaminated by light nonaqueous phase liquids (LNAPLs), metals, and organic compounds.

The June 9, 1992, Record of Decision (ROD) for the site, identified a sediment and surface soil remedy estimated to be $24,044,000; and a ground water remedy estimated to be $7,668,000. The construction of two on-site landfills and the treatment of contaminated sediment and surface soils were completed in November, 2001. The ground water remedy was not implemented. According to the Explanation of Significant Difference to the ROD, reported in 1995, this remedy would be re-evaluated after the removal of all sources, including those associated with the ORC North.

In April, 2003, the EPA conducted a site visit along with the ODEQ at the CPC refinery and tank farm (ORC North). ORC North is located adjacent to the downtown area of Cyril, Oklahoma, with residences abutting the site. There is asbestos insulation hanging off of the tanks, piping, and towers. ACM is also piled up on the ground, and stored in buildings on-site. Historical sampling results indicate approximately 87,937 ft² of ACM on vessels, tanks and buildings and 53,853 ft² of ACM on pipelines. There is an unsecured laboratory on-site within which are miscellaneous chemicals and improperly stored drums. There is a large, on-site tank with a faded sign that reads "Contains high concentrations of lead alkyl." Another tank contains a large quantity of unknown liquid (approximately 3/4 full). There are bulk chemicals sitting outside, some in disintegrated

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containers (bags). There is the distinct odor of H₂S from leaks in a portion of the refinery. Additionally, the site is not restricted, as there is evidence of children climbing on-site towers and also vandalizing buildings.

The refinery superstructure includes towers, process vessels, and buildings located within the project area (including an HF unit and the remnants of a TEL building), cooling towers and associated above-ground piping. Miscellaneous items include contents of collection basins of the cooling towers, sumps, ASTs outside the refinery superstructure containing hazardous materials, transformers containing polychlorinated biphenyls and structurally unsafe buildings. Removal assessment activities at the site have identified an HF alkylation process unit, which may contain HF liquid, vapors or scale; a sump and pipelines previously associated with a TEL building; partially razed and abandoned refinery equipment and structures containing chemicals and catalyst (including 75 towers, 237 process vessels); over 100 ASTs and 14 buildings where various chemicals have been stored. Additionally, there are visibly contaminated soils and LNAPLs which consist of petroleum product floating on the shallow ground water. There are also visibly contaminated soils and sediments in Gladys Creek, which borders the site. See Attachment 3 - Aerial Photograph of the Site Conditions in 2003.

The lead agency for the site, ODEQ, requested assistance from the EPA removal program to address the imminent and substantial threats to public health and the environment, from the CPC Refinery and tank farm (ORC North). On May 7, 2003, the Superfund Division Director verbally approved a $200,000 ceiling to initiate a classic emergency removal action at the site. On August 18, 2003, the EPA initiated work on the emergency removal action at the site, through an Interagency Agreement with the U.S. Corps of Engineers (USACE), to address 55-gallon drums found on-site, hundreds of containers from an on-site lab, and access controls (fence).

The EPA also received funding from the United States Coast Guard, allowing for the assessment of OPA wastes at site, including ASTs, shallow ground water and Gladys Creek.

2. Physical location

The ORC site is located at 2 West Main, in Caddo County, on the eastern edge of Cyril, Oklahoma, at the intersection of U.S. Highway 277 and State Highway 8. The site is bordered by Gladys Creek to the east, U.S. Highway 277 to the north, the City of Cyril to the west, and a Gladys Creek tributary to the south. See Attachment 4. The ORC site covers approximately 160 acres. Approximately one-half of the site (ORC North) consists of the CPC refinery and a tank farm area. The other half (ORC South) consists of grasslands and two remedial Land Treatment Units (LTUs).
The City of Cyril, which has a population of 1,168 (2000 Census), borders the western boundary of the ORC site. Some residences near the site obtain drinking water from a shallow aquifer, the Rush Springs Sandstone aquifer. The area outside of Cyril is rural and consists of many small farms and ranches. Typical land uses include wheat farming and cattle grazing. Gladys Creek is primarily used for fishing, wading, and cattle watering in the Cyril area. Gladys Creek flows into the Little Washita River, approximately 1.5 miles south of the ORC site.

3. Site characteristics

The site property consists of approximately 160 acres. Railroad tracks previously owned by Burlington Northern Railroad bisect the site, establishing what are referred to as “ORC North” and “ORC South” portions of the site. ORC North and ORC South include approximately 30 and 130 acres, respectively. See Attachment 5 - General Sketch of the Entire Site.

The ORC site has been inactive since 1984. The owners of ORC ceased operations and declared bankruptcy then. In 1987, CPC purchased ORC North, which included the refinery process area and tank farm, with the intention of re-activating part of the refinery. The refinery has been inactive and abandoned since the last startup attempt, in 1995. From the 1920s, the refinery produced a variety of petroleum products that included gasoline, naphtha, asphalt, and non-chlorinated solvents. Importation of a maximum of 15,000 barrels of crude oil per day for processing was reached in 1983. From 1920 to 1984, various refining processes were utilized, and included crude distillation, vacuum distillation, fluidized catalyst cracking, alkylation, bi-metallic reforming and downstream processing.

The topography in the Cyril, Oklahoma area is rolling and cut by deeply incised dendritic drainage systems. At the eastern and southern borders of the site, a deeply incised creek system forms a steep embankment. Stream banks are bounded by trees and underbrush, while the upland areas are covered by grasses and scrub oaks. The highest elevation, at the northwest corner, is approximately 1,380 feet above mean sea level (msl). The lowest elevation found at the site, is the bottom of Gladys Creek in the southeast corner, which is approximately 1,290 feet above msl. The topography of the site slopes moderately 3-4 percent to the east and south and slopes more steeply when approaching Gladys Creek. For a topographic map of the site See Attachment 6.

Surface water from the site, which includes storm water run-off from the northeast section of Cyril, flows to Gladys Creek and the unnamed, intermittent tributary to the east and south. Gladys Creek is used for flood control, with a stream flow southward. Gladys Creek eventually flows into Chetonia Creek, which, in turn, flows into the Little Washita River, approximately 1.5 miles south of the site. The Little Washita River is designated by the Oklahoma Water Resources Board (OWRB) as a public use stream, with potential public and private water supply and recreational uses.
The hydrogeologic setting for the ORC site includes the Rush Springs Sandstone and the Duncan Sandstone formations, as the principal ground water aquifers. The Rush Springs Sandstone aquifer is estimated to be between 200 feet and 350 feet thick at the site, and is the principal aquifer in the area. Water wells completed in the aquifer yield from 100 to 1,000 gallons per minute. Reports by others (from Stanley, 1985) state that ground water levels in the Rush Springs Sandstone aquifer range from 15 feet in the northwest corner of the site, to mere surface seepage in the southern portion of the site along Gladys Creek. The ORC site and the general vicinity of Cyril is the recharge area of this aquifer.

4. Release or threatened release into the environment of a hazardous substance, or pollutant or contaminant

Through analysis of 70 chemicals that may be present on-site and a comparison of toxicity, EPA determined that the main chemicals of potential concern for ORC North (CPC refinery and tank farm) were friable ACM, H₂S, benzene, HCl, TEL, sulfuric acid, hydrofluoric acid scale, mercury, arsenic, chromium, ammonia, and calcium hypochlorite. These are “hazardous substances” as defined in Section 101(14) of CERCLA, 42 U.S.C. §9601(14) and 40 C.F.R. §302.4.

According to the 1992 asbestos sampling results conducted by an asbestos consultant for CPC, approximately 53,853 linear feet of piping insulation and approximately 87,400 square feet of vessel insulation on ORC North contain friable ACM. Approximately 334 suspected ACM samples were collected from the refinery superstructure and analyzed using polarized light microscopy. Analysis indicated that 254 of these samples contained >1% asbestos fibers and are considered to be ACM. Amosite (1% to 97%) and chrysotile (2% to 90%) were the asbestos fibers detected in the samples. All the samples that contained asbestos fibers are friable, except the transite sheeting. Approximately 87,937 ft² of ACM has been identified on vessels, tanks and buildings and 53,853 ft of ACM has been found on pipelines. Additionally, there is loose and friable, suspected ACM littered on the ground, throughout the site, and also found to be improperly stored in buildings.

Completion of the exposure assessment resulted in the following direct contact exposure scenario for ORC North: The exposure of future site workers, visitors, and trespassers to chemicals via inhalation, ingestion, and dermal contact exposure routes. Dermal exposure and incidental ingestion could occur through the handling of on-site equipment during the dismantling of the facility, or from trespassers unaware of the inherent hazards of “playing” on facility equipment. Exposure via the dermal and ingestion exposure routes could also occur following spills and/or leaks from piping, vessels, and drums. On-site receptors could inhale asbestos fibers, contaminated soil particulates, and VOCs. Off-site receptors, e.g., residents living close to the site, could
also be exposed by inhaling asbestos fibers, contaminated soil particulates, and vapors carried by the wind into their breathing zone. Asbestos fibers and contaminated soil particulates can also be deposited onto off-site properties and then be ingested with soil or re-dispersed into the air. Additionally, nearby residents, are at risk in the event of a fire or explosion at the site.

The specific hazards at the site are as follows:

- Asbestos, a carcinogen, is hanging on piping and vessels at the site. Because the asbestos at the site is friable and exposed to the open air, a pathway exists for asbestos fibers to become airborne. The opportunity exists for people on and off the site to be exposed, primarily through the inhalation exposure route, but also through the ingestion of soil on which asbestos fibers may be deposited.

- Exposure to the wide array of on-site chemicals potentially can occur to the on-site worker or site trespasser via inhalation, ingestion, or dermal contact. Adverse health effects include minor to severe skin, mucous membrane, lung, and gastrointestinal irritation, neurological effects, death from systemic effects, asphyxiation, blood effects, and cancer. Many of the chemicals present, including HF and TEL, can be acutely dangerous to on-site workers and trespassers; low immediately dangerous to life and health exposure levels have been set by the National Institute for Occupational Safety and Health. Some of the chemicals potentially present are carcinogenic, e.g., benzene, ethylene dichloride, nickel, arsenic, and chromium.

- Asphyxiants are potentially present on-site. The threat of oxygen-deficient atmospheres (especially in confined spaces) exists near several of the process vessels that may contain chemicals such as hydrogen, methane, butane, carbon dioxide, H₂S, and gasoline.

- Pyrophoric iron sulfides may be present in refinery process units which could ignite spontaneously and cause more widespread fires.

- Releases to site soil and ground water containing hazardous chemicals from deteriorating and corroding process vessels and piping chemical contents may occur.

- Hydrocarbon vapors could create dangerous environments, including fires and explosive atmospheres. Additionally, hydrocarbon vapors could be blown off-site to neighboring residential areas and inhaled by residential receptors.

- The potential exists for release of asbestos and chemical contaminants into the environment in the event of inclement weather, such as a tornado. Release into the environment allows media such as soil and water to be contaminated and exposure routes to develop.

- There is the potential presence of catalysts in certain units that when
released (as through opening a valve) can flow like hourglass sand, posing a safety hazard by their swift release. Catalysts can be a chemical hazard through exposure by inhalation, ingestion, or dermal contact.

- Hazards associated with the on-going corrosion and deterioration of piping and vessels will increase over time; and,
- Threats to nearby residents exist from the threat of fire or explosions at the site. As asbestos is not destroyed by fire, it could be released to the air in the event of fire or explosion.

5. **NPL status**

The ORC site was proposed for placement on the NPL on June 24, 1988 and subsequently placed on the NPL on February 21, 1990.

6. **Maps, pictures, and other graphic representations**

1. List of Chemicals
2. RCRA Memo
3. 2003 Aerial Photograph
4. Site Location
5. General Sketch of the Entire Site
6. Topographic Map of the Site
7. Toxicological Effects of Chemicals
8. Site Sketch of Current Conditions
9. Enforcement Attachment

**B. Other Actions to Date**

1. **Previous actions**

An Action Memorandum for the EPA to conduct an emergency removal action at the site was signed on August 30, 1990. The scope of the removal action consisted of fencing the site, characterization of the contents and removal of 73 drums, plugging 25 wells in the acid pit area, and placing netting over several impoundments to protect wildlife. A unilateral administrative order was issued to CPC on January 25, 1991, ordering the company to perform the fencing on ORC North and the drum characterization. The CPC responded to the order to undertake the actions requested; however, the workplan submitted by CPC to perform the work was not adequate for the drum characterization. The CPC was allowed to proceed with the fencing of its property and the EPA performed the drum characterization, the well plugging and impoundment netting. The removal action on ORC North and ORC South was completed in August, 1991.
In 1993, a second EPA emergency removal action was conducted on ORC South. Removal activities included: Skimming the API separator lagoons, as needed; installation of additional fencing (approximately 3,800 feet); and, re-stretching the protective bird netting.

The State of Oklahoma began a remedial investigation/feasibility study in November, 1990, to evaluate the extent and magnitude of contamination at the site. Based on these investigations, the EPA selected the means for biological treatment, neutralization, and stabilization of the wastes in a ROD in June, 1992.

The Remedial Action began in July, 1997, and was completed in October, 2001. The Contractor, Philip Services Corporation, completed the bio-remediation of 92,517 cubic yards of contaminated soil; completed the neutralization of 16,017 cubic yards of contaminated soil; completed the stabilization of 14,401 cubic yards of contaminated soil; and removed 12,000 cubic yards of pitch and asphalt material. The Contractor then completed the cover on both landfills, the landscaping, and seeding of the southern portion of the site.

An Explanation of Significant Differences was signed by the Regional Administrator on March 27, 1996 to postpone the "pump and treat" ground water treatment system, until further evaluations can be made after remediation of the surface wastes are complete. An LNAPL cutoff/collection trench will be constructed to collect floating product down-gradient of the refinery. The collected product is to be recycled, if feasible.

2. Current actions

The EPA is conducting an emergency removal action to address the imminent and substantial threats to public health and the environment. On May 7, 2003, the Superfund Division Director verbally approved a $200,000 ceiling to initiate a classic emergency removal action at the site. On August 18, 2003, the EPA initiated work on the emergency removal action at the site. The EPA is conducting this work through an Interagency Agreement with the USACE. The emergency removal action at the site is addressing drums, lab chemicals and access controls (fence). The EPA’s presence allowed for the investigation of other hazards at the site, to further define environmental cleanup needs.

The United States Coast Guard approved funding for a removal assessment of Gladys Creek and shallow ground water, pursuant to the Clean Water Act (CWA), 33 U.S.C. 1321, et seq., as amended by the Oil Pollution Act of 1990.
C. State and Local Authorities’ Role

1. State and local actions to date

Pursuant to a Cooperative Agreement with EPA, the ODEQ is the lead agency for remedial activities. The ODEQ continues to provide leadership with community relations, sampling of suspected ACM, and investigation of hazards at the site. However, the State does not have the resources to undertake a response action to address the emergency conditions and clean up the contamination. The State of Oklahoma concurs with the EPA that the response action should be taken. The ODEQ has agreed to sign a Superfund State Contract to fund 10% of this removal action ($400,000 plus in-kind services).

2. Potential for continued State/local response

The ODEQ remains the lead agency for remedial activities and will re-evaluate the ground water remedy outlined in the ROD, after source materials at the site are addressed by this removal action. Additionally, ODEQ is part of the technical review team working with EPA to oversee the conduct of this removal action.

III. Threats to Public Health or Welfare or the Environment, and Statutory and Regulatory Authorities

A. Threats to Public Health or Welfare

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP), at 40 CFR §300.415, lists the factors to be considered in determining the appropriateness of a Removal Action. The following paragraphs of Section 300.415 of the NCP apply to the ORC site:

1. [Section 300.415 (b) (2) (i)] - “Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances or pollutants or contaminants.”

An industrial worker is the most likely receptor to be exposed to chemical and physical hazards, during future on-site activities. Residential properties are located directly adjacent to both the Northern and Southern refinery areas, and there is evidence that teenagers and others have been trespassing onto the site. Trespassers have left evidence (e.g., debris, graffiti) of “parties” occurring on the stacks of the operating units and in other areas of the site. A portion of fence on the west side of the site was repaired three times by EPA. During an inspection earlier this year, it was observed that the fence had been breached again.
More than 70 chemicals have been identified as potentially being present on-site. Notable potential toxicological effects on people exposed to these chemicals are summarized in Attachment 7. Potentially, a wide array of adverse human health effects could occur through the inhalation, ingestion, or dermal contact with chemicals on-site. Effects include minor to severe irritation of skin, mucous membrane, lung, and gastrointestinal tract; neurological effects; death from systemic effects and asphyxiation; blood effects; and cancer. Potential effects of some of the more toxic chemicals which are hazardous substances as defined at Section 101(14) of CERCLA, 42 U.S.C. § 9601(14), and further defined at 40 CFR § 302.4, are summarized below:

a. Tetraethyl lead – TEL may still be present in pipes connected to the former TEL building, and in vessels to which these pipes lead. Due to high lead concentration, TEL poses a significant toxic threat. Petroleum industry statistics indicate that almost two dozen people have been killed worldwide in explosions this year while handling/using TEL. TEL can be absorbed easily through the skin upon dermal contact. Upon acute exposure, convulsions, dizziness, headache, unconsciousness, vomiting, and weakness can occur.

b. Hydrogen sulfide – H$_2$S is extremely hazardous. Upon acute exposure, collapse, coma, and death can occur from respiratory failure within a few seconds. Low concentrations produce irritation of conjunctiva and mucous membranes, and headaches, dizziness and nausea.

c. Benzene – Benzene is a carcinogen. Systemic effects include irritation to mucous membranes, restlessness, convulsions, and depression.

d. Hydrochloric acid (HCL) – Exposure of the skin and mucous membrane to HCL can cause such immediate toxic effects as burns, dermatitis, and permanent eye damage.

e. Sulfuric acid – This chemical is corrosive to all body tissues. Inhalation can cause lung damage; contact with the eyes can result in blindness; ingestion causes severe internal injuries and death; and dermal contact can cause severe necrosis.

f. Hydrofluoric acid – HF is extremely irritating and corrosive to the skin and mucous membranes, causing severe burns and possibly permanent eye damage. Inhalation of vapors is extremely irritating to the respiratory tract, causing pulmonary inflammation and congestion. Ingestion of HF can cause necrosis of the esophagus and stomach and death.

g. Mercury – Inhalation of high levels of mercury vapors can lead to severe respiratory irritation and death. Chronic exposure can cause central nervous system toxicity and kidney damage.

h. Arsenic – Arsenic is a carcinogenic. Ingestion can cause gastrointestinal disturbances which can lead to shock and death. Arsenic is also a respiratory and dermal irritant.

i. Chromium – Chromium is a skin, eye, and respiratory irritant.
j. **Ammonia** – Skin freezes upon contact with ammonia, causing corrosive burns and blistering. Severe irritation of the respiratory tract occurs when inhaled.

k. **Calcium hypochlorite** – This substance is a severe mucous membrane irritant, and is corrosive on the skin, causing severe burns and possible scarring. Inhalation of vapors can cause pulmonary edema.

Residents living, working, and playing in and near the site may be affected by the release of friable asbestos, which is a hazardous substance as defined at Section 101(14) of CERCLA, 42 U.S.C. § 9601(14), and further defined at 40 CFR § 302.4. The results of the asbestos surveys conducted in 1992, indicate that there is approximately 87,937 ft² of ACM on vessels, tanks and buildings and 53,853 ft² of ACM on pipelines. Specifically identified was Chrysotile and Amosite asbestos. The ACM associated with the piping and vessels at the facility is friable and has weathered and deteriorated over time posing an increasing risk of release to the air. Additionally, ACM is littered around the grounds of the refinery in numerous places, where the ACM has been stepped on or driven over. ACM that has been exposed to air may be picked up by the wind and carried off-site. Asbestos fiber inhalation has been linked to several diseases and conditions. These include asbestosis, lung cancer, mesothelioma, gastrointestinal cancers, and other abnormalities.

2. **[Section 300.415 (b) (2) (iii)]** - “Hazardous substances or pollutants or contaminants in drums, barrels, tanks, or other bulk storage containers, that may pose a threat of release.”

   Over 70 miscellaneous chemicals are suspected to be present within the 20,000 linear feet of piping and vessels. The deteriorating and corroding refinery superstructure poses an increasing threat of release of hazardous substances to the environment.

3. **[Section 300.415 (b) (2) (v)]** - “Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released.”

   Cyril, Oklahoma is subject to several types of extreme weather conditions, such as heavy storms, tornadoes, and strong winds. These weather conditions have the potential to release asbestos fibers into the air, and to further damage vessels and piping containing hazardous substances, thus, releasing them into the environment. The freeze/thaw cycle may cause additional deterioration of the vessels and piping.

4. **[Section 300.415 (b) (2) (vi)]** - “Threat of fire or explosion.” hazardous substances at the site present a severe threat of fire or explosion.

   There is a threat of explosions/fires due to hydrocarbon vapors, H₂S, hydrogen gas, and pyrophoric iron sulfides suspected to be present in vessels and
piping throughout the refinery. The threat of oxygen-deficient atmospheres in the presence of chemicals such as hydrogen, methane, butane, carbon dioxide, H₂S, and gasoline (asphyxiants) also exists near several of the process vessels. Additionally, TEL is highly explosive and presents a severe threat of release by explosion. It is flammable when exposed to heat, flame or oxidizers. Evidence of historical vandalism at the site raises concerns that juveniles smoking on-site could start a fire that may become uncontrollable. A smoke plume from a fire at the site could affect people living and working adjacent to the site.

5 [Section 300.415 (b) (2) (vii)] - “The ability of other appropriate federal or state response mechanisms to respond to the release.”

Upon a release, assistance will not otherwise be provided on a timely basis, because neither the State of Oklahoma nor local governments have the resources to deal with a site of this complexity or magnitude.

B. Threats to the Environment

Wildlife may be exposed to and harmed by contaminants at the site. Wildlife at the site includes, bobcat, deer, roadrunners, migrating waterfowl and recreational fish species. Run-off from the site enters Gladys Creek. Gladys Creek, downstream of U.S. Highway 277, is designated as a limited fishery habitat and for secondary body contact. Above U.S. Highway 277, it is designated as a public and private water supply and a primary recreation stream. Gladys Creek flows into Chetonia Creek, which does not have a specific beneficial use designation. Chetonia Creek flows into the Little Washita River, approximately 1.5 miles south of the ORC site, and is designated for primary recreation and public/private water supply.

Most refinery wastes that might enter the drainage basin have direct toxic effects on the aquatic biota. These wastes often float on the surface of the receiving stream and inhibit natural gas exchange between the water body and the atmosphere. This can quickly result in depressed oxygen and high mortality to most forms of stream life. This oxygen deprivation effect is often one of the most significant adverse environmental affects of oily wastes entering water bodies.

IV. Endangerment Determination

If not immediately addressed, actual or threatened releases of hazardous substances from this site may present an imminent and substantial endangerment to public health, or welfare, or the environment.
V. Exemption From Statutory Limit

The authority to conduct the removal action described in this memorandum and the authority to make the findings necessary to obtain the statutory exemption is vested in the President of the United States by Section 104 of CERCLA, 42 U.S.C. §9604. This authority is delegated to the Administrator of the EPA by Executive Order Number 12580, January 23, 1987, 52 FR 2923, and redelegated to the Regional Administrator of EPA Region 6 by Delegation 14-2-B, and further to the Superfund Division Director by Delegation R6-14-2-B. The proposed source removal measures are appropriate and consistent with the June 9, 1992, ROD and Explanation of Significant Difference to the ROD, reported in 1995 for this site. This proposed removal action therefore warrants exemption from the two million dollar statutory limitations on removal actions. Approval of this action will invoke the consistency waiver (exemption) to the statute.

VI. Proposed Actions and Estimated Costs

A. Proposed Actions

The removal action will address the refinery superstructure and miscellaneous items. Refinery superstructure includes refinery process towers, vessels and associated above-ground piping (including an HF unit and the remnants of a TEL building), cooling towers and buildings located within the project area. Miscellaneous items include contents of collection basins of the cooling towers and sumps, ASTs containing hazardous materials outside the refinery superstructure, and structurally unsafe buildings. See Attachment 8 - Site Sketch of Current Site Conditions.

1. Proposed Action Description:

The removal action which will address the source material in the ORC North refinery superstructure, consists of purging the refinery superstructure of contaminants, controlling the fall of towers and vessels, using cranes or explosives, and dismantling the remaining refinery structures in combination with the abatement of ACM. The foundations of the structures would remain in place. Any buried pipes would be capped at the surface after removing the contents of the pipes.

Purging of Refinery Superstructure: Wrapped pipes, tanks and vessels will be accessed, by using pipe taps, breaking flanges, and opening valves in areas where asbestos has been abated (i.e., glove-bagged areas). Once accessed, the individual lines and units will be tested for hazardous materials or flammable atmospheres. When gasoline, diesel fuel or butane is present, vac trucks will be used in combination with pressure washers to remove/collect chemicals. In addition to using vac trucks, lines may be steamed to remove liquids or vapors before being cut or lowered. As other hazardous substances are discovered, specific response plans and safety protocol will be developed on a case by case
basis. For instance, decontamination solutions of water and lime, water and trisodium phosphate and/or calcium hypochlorite or sodium hypochlorite (e.g. bleach) may be used depending on the properties of the contaminants found.

**ACM Abatement:** ACM abatement would be performed concurrently with the controlled fall of towers and vessels, and the dismantling of the refinery structures. An Asbestos Abatement Project Design is under development to specifically outline abatement procedures to be used at the site. In general, abatement activities include the use of decontamination tents and windwalls. Generally, “Cut and Wrap” procedures are used to address ACM on pipes and structures. This procedure refers to wrapping ACM-covered pipes and structures in polyethylene sheeting. Glove bags are used to abate ACM from sections of the pipes, which may then be cut into manageable sections (less than 20 feet) using metal shears, cutting torches or saws. Sections are then lowered onto trailers or into roll-off boxes for transport and off-site disposal at a compliant facility. The larger vessels/structures and pipes greater than 14" are generally abated on-site using gross removal techniques. All abated ACM would be bagged and transported off-site for disposal.

**Dismantling of Refinery Superstructure:** Once pipes are cleared of hazardous substances and no vapors are detected using air monitoring equipment, then metals’ shears, torches and/or saws will be used to cut pipes into manageable sections for transport.

**Towers and Vessels:** Once the contents of the vessel or tower have been removed and ACM has been abated or prepared, to prevent fiber release during structural collapse (wrapping or appropriate utilization of wet methods), cranes will be used to lower towers to the ground in a controlled manner. Where it is not feasible to use cranes (due to size or weight of the tower), explosives would be placed along the base of the equipment by a specialized subcontractor. The explosives would be placed in such a manner as to control the fall of the tower or vessel, where it can be then further dismantled, if necessary. This process would continue until all of the large towers and vessels have been dismantled. It should also be noted that purging would not completely remove the contents, including solid residues, from the pipes and vessels. Appropriate mechanisms and controls would be set in place, to prevent any release of the remaining contents to the environment, during the controlled falls. The generated wastes would be disposed of off-site, after waste consolidation and characterization.

**Disposal of Process Vessel and Piping Waste:** Hazardous liquids and solids removed from the process vessels and piping will be characterized and combined into compatible waste streams, prior to off-site disposal. Wash water would be segregated from the contents of the vessels and characterized prior to off-site disposal or on-site treatment, with a carbon treatment filter unit.
Depending on the type and quantity of non-hazardous oily wastes from the refinery structure, material will be consolidated (bulked) and biologically treated on-site, or recycled or disposed of off-site. If bio-remediation is selected, a final cleanup level of 1.0% to 2.0% by weight (10,000 to 20,000ppm) Total Petroleum Hydrocarbons (TPH) will be used for oily wastes treated on-site. At this concentration, almost all of the water soluble and, therefore, potentially mobile contaminants will have been degraded. Treated soil may be used to backfill separators, impoundments, ponds, or other features. Bio-remediation of oily wastes on-site would not contribute additional risks or hazards.

**Effectiveness**

This action would be effective in eliminating the threats to human health and the environment posed by ACM and hazardous materials associated with the refinery superstructure and attain the removal action objectives. By removing the source of contaminants in the superstructure, this action would be effective in: 1) Eliminating the potential for migration of contaminants into soil and shallow ground water; 2) eliminating the fire and explosion threat to nearby residents; and, 3) effectively reducing both the current and future risks at the site, associated with potential direct human contact with on-site contaminants. Residual subsurface piping may remain at the site. However, the majority of hazardous material in ORC North would be removed. Biological treatment of oily wastes will reduce the volume, toxicity and mobility of non-hazardous contaminants.

The land use for this site is currently industrial. Future land use of this property is unknown at this time. The response actions described herein remove source materials, so if any change in this land use is being contemplated or implemented, this action will enhance any future land use. Remaining risks in soil, surface water and ground water will be re-evaluated by the ODEQ, after source materials have been addressed by this removal action, and any OPA action conducted at the site. The short-term risks associated with implementing this action would involve potential worker exposure to contaminants during abatement, purging, demolition or dismantling of towers and vessels; loading; transport; and off-site treatment. Exposure to the public and the environment could also occur from airborne particulates and contaminant volatilization, surface run-off, or as a result of an accidental spill during transport. The release of airborne ACM fibers would be minimized utilizing proper handling and abatement techniques, including wetting, wrapping, etc. Contaminant-specific responses (e.g., carbon vapor scrubber, blowers, etc.) to volatile chemicals will be implemented as necessary. Air monitoring would be used to ensure that emissions of site contaminants do not exceed applicable State and Federal action levels for ambient air quality. Risks to site workers would be minimized by compliance with applicable Occupational Safety and Health Administration (OSHA) requirements and guidelines for hazardous waste site activities.
All material-handling and transportation operations would comply with the appropriate RCRA and Department of Transportation (DOT) regulations. These regulations are designed to minimize the possibility of accidental release during transport and to reduce the hazards associated with such a release, should one occur. Transport of material off-site would result in some increase in traffic around the site, with potential increases in noise and fugitive dust emissions. These impacts, however, would be of limited duration.

It is estimated that this removal action could be completed in approximately eight months, which includes mobilization; purging and demolition; transporting; and off-site treatment of the material.

- **Implementability**

Asbestos abatement, purging and dismantling of the refinery superstructure, as well as transport and off-site treatment of contaminated material, could be implemented, using conventional construction equipment. To implement the controlled fall of towers and vessels, highly specialized contractors would have to be procured. The use of a specialty contractor to drop vessels with controlled falls can ensure a safer work area as workers would remain at safe distances from a collapse, thus reducing injuries from falling metal. Because many of the catwalks and ladders associated with the large vessels and towers are unstable, safety harnesses would be required by workers at elevated levels on the structures, during the dismantling.

No maintenance would be required after completion of the removal action. Operation and maintenance of the off-site treatment and landfill facilities would be the responsibility of the owner/operators of those facilities. The capacity of the RCRA-permitted landfill and treatment facilities may be severely limited at the time of implementation. Pricing and waste storage availability may also vary from current conditions. Excavation and off-site treatment/disposal of contaminated material would be compatible with any future remedial activities, including possible future soil or shallow ground water remediation.

The project design for the demolition of the refinery superstructure would include ACM abatement, so that the two activities may be performed concurrently.

2. **Contribution to remedial performance**

The ORC site was proposed for placement on the NPL on June 24, 1988, and was subsequently placed on the NPL on February 21, 1990. The June 9, 1992, ROD for the site, identified a sediment and surface soil remedy estimated to cost $24,044,000; and a ground water remedy estimated to cost $7,668,000. The construction of two landfills on-
site and the treatment of contaminated sediment and surface soils were completed in November, 2001. The ground water remedy was not implemented. According to the Explanation of Significant Difference to the ROD, reported in 1995, this remedy would be re-evaluated after the removal of all sources, including those associated with ORC North. Because the removal action described in this Action Memorandum is in the nature of a source control action, the removal action will contribute to the ROD for this site.

3. Description of alternative technologies

The proposed action includes removal and off-site disposal of the chemical wastes that pose the highest risk to public health. No alternatives technologies can be applied to these portions of the cleanup.

4. Engineering Evaluation/Cost Analysis (EE/CA)

An EE/CA is not applicable to this project, because of its emergency nature.

5. Applicable or Relevant and Appropriate Requirements (ARARs)

This removal action will be conducted to eliminate the actual or potential release of hazardous substances, pollutants, or contaminants to the environment pursuant to CERCLA, 42 U.S.C. § 9601 et seq., in a manner consistent with the NCP, 40 CFR Part 300, as required at 33 U.S.C. § 1321(c)(2) and 42 U.S.C. § 9605. Pursuant to 40 CFR § 300.415(j), removal actions under Sections 104 or 106 of CERCLA, 42 U.S.C. §§ 9604 and 9606, shall, to the extent practicable considering the exigencies of the situation, attain applicable or relevant and appropriate standards under Federal environmental law, including but not limited to, Toxic Substances Control Act (TCSA), 15 U.S.C. Section 2601 et seq., Clean Air Act (CAA), 42 U.S.C. Section 7401 et seq., Solid Waste Disposal Act (SWDA), 40 U.S.C. Section 6901 et seq., the RCRA, 42 U.S.C. Section 6901 et seq., Fish and Wildlife Coordination Act (FWCA) 16 U.S.C. Section 661 et seq., Hazardous Materials Transportation Act (HMTA) 49 U.S.C. Section 1801 et seq., or any promulgated standard, applicable or relevant and appropriate requirements, criteria or limitations under a State environmental or facility citing law that is more stringent than any Federal standard, requirement, criteria, or limitation contained in a program approved, authorized or delegated by the Administrator and identified to the President by the State.

The purging of the refinery superstructure will generate hazardous wastes, that will require testing, analysis and off-site disposal. As such, RCRA waste analysis requirements found at 40 CFR §§ 261.20 and 261.30 are applicable for the site. If the waste analysis reveals that this material is hazardous waste, then RCRA manifest requirements found at 40 CFR § 262.20, and RCRA packaging and labeling requirements found at 40 CFR § 262.30 may be appropriate requirements for this removal action. The DOT regulations contain requirements for transportation of hazardous materials, including hazardous wastes, to locations off-site. All hazardous substances, pollutants, or contaminants
removed off-site for treatment, storage, or disposal shall be treated, stored, or disposed of at a facility in compliance, as determined by EPA, pursuant to CERCLA Section 121(d)(3), 42 U.S.C. Section 121(d)(3), and the following rule: “Amendment to the National Oil and Hazardous Substances Pollution Contingency Plan; Procedures for Planning and Implementing Off-Site Response Action: Final Rule.” 58 FR 49200 (September 22, 1993), and codified at 40 CFR § 300.440.

Because on-site storage of hazardous wastes is not expected to exceed ninety days, specific storage requirements found at 40 CFR § 265 are neither applicable, relevant or appropriate. See 40 CFR § 262.34.

If on-site land treatment of non-hazardous wastes is utilized, the RCRA land disposal restrictions (LDRs) found at 40 CFR § 268 may be applicable for that activity. The criteria for solid waste disposal facilities may be applicable for any on-site and off-site disposal of RCRA non-hazardous waste (40 CFR §§ 257 and 258). An on-site hazardous waste treatment/storage/disposal unit may require run-off protection from rain, as well as run-off containment to prevent additional spread of hazardous wastes. Also, the Clean Water Act (CWA) storm water provisions may be applicable (40 CFR §§ 122.21 and 122.26). The CWA and its amendments address spills or releases of oil and hazardous substances to navigable waters. Some of the potential chemicals on-site are on the CWA priority pollutants list.

Because asbestos and other chemicals at the site are designated by the Clean Air Act (CAA) as hazardous air pollutants, some of the requirements for the National Emission Standard for Hazardous Air Pollutants (NESHAPS) found at 40 CFR § 61 will be applicable, during ACM abatement and demolition activities.

Asbestos abatement and de-commissioning of the refinery superstructure are the principal elements of this removal action. The analysis of ARARs identified the following as applicable State regulations: 1) The Oklahoma Department of Labor regulations for asbestos abatement (OAC 380:50), training, sampling, and procedural requirements for ACM abatement work; 2) the ODEQ emission standard for asbestos (OAC 252:100-41-16); 3) ODEQ air pollution control rules (OAC 252:100), for air contaminant sources, emissions, and control; 4) ODEQ regulations for hazardous waste management (OAC 252:205); 5) ODEQ storm water discharge regulations (OAC 252:605), associated with construction and industrial sites; 6) ODEQ solid waste management regulations (OAC 252:520), waste characterization and waste manifest, shipment requirements for solid waste disposal facilities, including construction/demolition landfills and non-hazardous industrial solid waste landfills; and 7) Oklahoma Corporation Commission hazardous waste transportation regulations (OAC 165:30), hazardous waste registration and permitting requirements for trucking, since July, 2000.
In addition, other items have been identified as requirements to be considered (TBCs). Due to expected demolition activities that could cause air emissions, many of the on-site chemicals may be subject to the EPA national ambient air quality standards (NAAQS), set forth in 40 CFR § 50, and ODEQ maximum acceptable ambient concentrations (MAACs) for toxic air contaminants based on occupational exposure limits. Therefore, these are TBC requirements for the site. Additionally, ODEQ provides TBC information on the bio-remediation of excavated petroleum-contaminated soil to facilitate the approval of work plans proposing one-time bio-treatment, using conventional land-farming techniques. Included in the guidance is default cleanup goals for TPH, and the requirements for consent orders, temporary staging, sampling and analyses, and work plans.

6. Project Schedule

It is estimated that implementation of the proposed action will take approximately eight months. As in all schedules for environmental construction, the weather can impact the progress of work. The time frames presented, however, do account for periods of normally inclement weather and associated shutdown periods.

B. Estimated Costs

Extramural Costs:

<table>
<thead>
<tr>
<th>USACE</th>
<th>$ 4,000,000</th>
</tr>
</thead>
</table>

Other Extramural Costs:

<table>
<thead>
<tr>
<th>START</th>
<th>$ 50,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>USCG</td>
<td>$ 80,000</td>
</tr>
<tr>
<td></td>
<td>$ 130,000</td>
</tr>
</tbody>
</table>

TOTAL EXTRAMURAL COSTS $ 4,130,000

Contingency $ 200,000

TOTAL REMOVAL PROJECT CEILING $ 4,330,000

VII. Expected Change in the Situation Should Action Be Delayed or Not Taken

Should the actions described in this Action Memorandum be delayed or not taken, the potential for human and ecological exposure to hazardous substances will remain unabated.
VIII. **Outstanding Policy Issues**

There are no outstanding policy issues.

IX. **Enforcement**

For administrative purposes, information concerning any confidential enforcement strategy for the Site is contained in the Enforcement Confidential Attachment #9. The total for this removal action, based on full-cost accounting practices that will be eligible for cost recovery, are estimated to be $6,454,067.

\[(\text{Direct Cost}) + (\text{Indirect Cost}) = \text{Estimated EPA Costs for a Removal Action}\]

\[($4,330,000 + $100,000) + (45.69\% \times $4,430,000) = $6,454,067\]

Direct costs include extramural costs and direct intramural costs. Indirect costs are calculated based on an estimated indirect cost rate expressed as a percentage of Site specific direct costs, consistent with the full cost accounting methodology effective October 2, 2000. These estimates do not include pre-judgement interest, nor do they take into account other enforcement costs, including Department of Justice costs, and may therefore be adjusted during the course of a removal action. The estimates are for illustrative purposes only, and their use is not intended to create any rights for responsible parties. Neither the lack of a total cost estimate nor deviation of actual total costs from this estimate will effect the United States' right to cost recovery.

X. **Recommendation**

This decision document contains the recommended removal action for the Oklahoma Refining Company site in Cyril, Caddo County, Oklahoma, developed in accordance with CERCLA, 42 U.S.C. § 9601 et seq., and is not inconsistent with the NCP, 40 CFR Part 300. This decision is based on the administrative record for the site.

Because conditions at the site meet the criteria defined in Section 300.415 of the NCP and meet the statutory criteria for a consistency waiver, I recommend your approval of the proposed removal action and exemption from the $2 million statutory limit on removal actions. The total project ceiling is $4,330,000, of which an estimated $4,000,000 comes from the removal allowance.

APPROVED: [Signature] DATE: 9-25-03
This Target sheet is inserted in place of the Enforcement Attachment. This document has been withheld as ENFORCEMENT SENSITIVE and is located only in a separate "confidential files" at U.S. EPA, Region 6.
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- Lat / Long
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Map Legend

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ENTIRE-FACILITY DEFERRAL DOCUMENTATION

RCRA TO SUPERFUND AUTHORITY

The facility currently known as Cyril PetroChemical Corporation with EPA ID No. OKD982558900 located at 100 East Main Street (U.S. 277 and State Hwy 8 intersection) in Cyril, Caddo County, in the State of Oklahoma, is and remains a facility subject to RCRA Corrective Action (CA).

The RCRA and the Superfund programs have determined it is most advantageous for the Superfund program to address the Corrective Action responsibilities at this facility which exists on the north end of the Oklahoma Refining Company (ORC) Superfund site in Cyril. Because the facility is being deferred to the Superfund program, the Superfund program will be tracking progress (e.g., GPRA or other tracking) under their measures, and the facility will no longer be tracked on the RCRA Corrective Action program's GPRA Baseline or other tracking measures.

Attached is the following information concerning the facility:

1. Summary of the facility history, including:
   a. The RCRA §3008(h) Unilateral Administrative Order (UAO) for Remediation;
   b. The reasons for the deferral;
      i. default on (i.e., failure to comply with) the UAO;
      ii. inability to pay remediation costs as documented by Agency analysis of ability to a penalty under authority of the Clean Water Act.

2. A copy of the RCRA Info printout, documenting the deferral of the facility.

3. A copy of the Administrative Record of the Enforcement Case Development against the facility. Gene Keepper is the Enforcement Division RCRA Project Manager (6EN-HX) for this deferral. He may be reached at x2280 (214-665-2280).

Documentation of this deferral, including all attachments shall be retained in the official RCRA program files. Documentation of this deferral, excluding the Administrative Record of the Enforcement Case Development shall be retained in the official Superfund program files.

Samuel Coleman
Director, Compliance Assurance and Enforcement Division Region 6

Myron Knudson, Region 6
Date
Director, Superfund Division, Region 6

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TOTAL P. 02
Appendix A

Human Health Effects of Hazardous Chemicals
Hudson Oil Refinery, Cushing, Oklahoma

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Signs and Symptoms (References)</th>
<th>PEL/TLV(^1)</th>
<th>IDLH(^2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alumina</td>
<td>Inhalation irritation, coughing, shortness of breath; eye and skin irritant. (S)</td>
<td>15 mg/m(^3) / 10 mg/m(^3)</td>
<td>-</td>
</tr>
<tr>
<td>Ammonia</td>
<td>Skin irritant, corrosive burns, blistering. Skin freezes on contact. Inhalation: severe irritation of respiratory tract, glottal edema, bronchospasm, pulmonary edema, respiratory arrest. (M)</td>
<td>35 mg/m(^3) / 17 mg/m(^3)</td>
<td>210 mg/m(^3)</td>
</tr>
<tr>
<td>Arsenic (As)</td>
<td>Carcinogen through oral and inhalation routes. Acute: ingestion causes nausea vomiting, diarrhea that can progress to shock and death. Dermal effects. Chronic: polyneuropathies, anorexia, hepatitis, anemia. (M)(S)</td>
<td>.01 mg/m(^3)</td>
<td>5 mg/m(^3) as As</td>
</tr>
<tr>
<td>Asbestos</td>
<td>Carcinogen. Prolonged or repeated exposure to airborne asbestos fibers from sanding, cutting, scraping, etc., may lead to asbestosis and mesothelioma. Dust may cause eye irritation.</td>
<td>0.1 fibers/cc</td>
<td>-</td>
</tr>
<tr>
<td>Benzene</td>
<td>Carcinogen. Acute by ingestion or inhalation: irritation to mucous membranes, restlessness, convulsions, depression. Chronic: Pancytopenia, hearing impairment, polyneuritis. (M)(I)</td>
<td>3 mg/m(^3) / 1.6 mg/m(^3) skin</td>
<td>1595 mg/m(^3)</td>
</tr>
<tr>
<td>Boron (exposure values are for boron oxide)</td>
<td>Acute: irritant to eyes, mucus membranes, and gastrointestinal (GI) tract. Central nervous system (CNS) effects. If ingested or dermally absorbed, can be fatal.</td>
<td>15 mg/m(^3) / 10 mg/m(^3)</td>
<td>2000 mg/m(^3)</td>
</tr>
<tr>
<td>Butane</td>
<td>Acute: by inhalation causes drowsiness. Asphyxiant. (S)</td>
<td>- / 1900 mg/m(^3)</td>
<td>nd</td>
</tr>
<tr>
<td>Cadmium (Cd)</td>
<td>Carcinogen by inhalation. Acute: GI distress, lung irritation. Chronic: lung, kidney, liver, bone, testes, immune system, and cardiovascular system effects. (A)</td>
<td>.005 mg/m(^3) / .01 mg/m(^3)</td>
<td>9 mg/m(^3) as Cd</td>
</tr>
<tr>
<td>Calcium Fluoride</td>
<td>Mild irritation to skin, eyes, and respiratory tract. Coughing, shortness of breath. Harmful if swallowed. (HC)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Calcium Hypochlorite</td>
<td>Severe eye, nose, mouth, and throat irritant. Stomach irritation, vomiting, diarrhea. Corrosive, severe burns, and scarring possible. Inhalation of vapors can cause pulmonary edema. (M)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Carbon Dioxide</td>
<td>Asphyxiant. Eye irritant. Burns on contact with liquid. (S)</td>
<td>9000 mg/m(^3)</td>
<td>72,000 mg/m(^3)</td>
</tr>
<tr>
<td>Chromium (Cr)</td>
<td>Chromium +6 is a carcinogen by inhalation only. Skin and respiratory irritant leading to ulceration. (N)</td>
<td>1 mg/m(^3) / .5 mg/m(^3)</td>
<td>250 mg/m(^3) as Cr</td>
</tr>
<tr>
<td>Cobalt (Co)</td>
<td>Acute: Inhalation: pulmonary symptoms, irritation, burning, cough, methemoglobinemia, pain, abdominal pain, flushing, deafness, rash, goiter, redness, shortness of breath, vomiting, cyanosis, thyroid enlargement, ankle swelling. Ingestion: nausea and vomiting. (HC)</td>
<td>0.1 mg/m(^3) / 0.02 mg/m(^3)</td>
<td>20 mg/m(^3) as Co</td>
</tr>
</tbody>
</table>

Appendix A (cont)
<table>
<thead>
<tr>
<th>Chemical</th>
<th>Signs and Symptoms (References)</th>
<th>PEL/TLV(^1)</th>
<th>IDLH(^2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crude Oil</td>
<td>Can contain carcinogens, e.g., benzene and polyaromatic hydrocarbons (PAHs) such as benzo(a)pyrene, chrysene. Liquid irritating to skin and eyes. (HC)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Diesel Fuel Oil</td>
<td>Inhalation of vapors can cause headache and stupor. Ingestion effects are irritation of the stomach and GI tract, nausea, and vomiting. Irritating to skin and eyes. (HC) (S)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Diethanolamine</td>
<td>Acute: Mild eye, nose, and skin irritant, redness. Moderately toxic by ingestion. (S)</td>
<td>- / 2 mg/m(^3) skin</td>
<td>-</td>
</tr>
<tr>
<td>Diisopropanolamine</td>
<td>Eye, nose, skin irritation with redness, burns, pain. Ingestion: GI irritation and cramps. (C)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Diisopropylamine</td>
<td>Acute: harmful if swallowed, inhaled, or absorbed through skin. Extremely destructive to tissue of mucous membranes and upper respiratory tract, eyes, and skin. (S)</td>
<td>20 mg/m(^3) / 21 mg/m(^3) skin</td>
<td>828 mg/m(^3)</td>
</tr>
<tr>
<td>Ethane</td>
<td>Acute: asphyxiant. (M)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Ethanolamine</td>
<td>Harmful if ingested, inhaled, or absorbed through skin. Extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin.</td>
<td>6 mg/m(^3) / 7.5 mg/m(^3)</td>
<td>75 mg/m(^3)</td>
</tr>
<tr>
<td>Ethylbenzene</td>
<td>Acute: throat irritation, chest constriction, eye and nose irritation, dizziness, vertigo. (A)</td>
<td>435 mg/m(^3) / 434 mg/m(^3)</td>
<td>3472 mg/m(^3) (10% of LEL)</td>
</tr>
<tr>
<td>Ethyl Mercaptan</td>
<td>Acute: severe eye and skin irritant. Inhalation: nausea, headache. At high concentrations can cause unconsciousness with cyanosis, cold extremities, and rapid pulse.</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Ethylene Dichloride</td>
<td>Carcinogen. Vapors produce irritation of respiratory tract and conjunctiva, corneal clouding, equilibrium disturbances, narcosis, abdominal cramps. Poison by ingestion and inhalation. (S)</td>
<td>c 100 mg/m(^3) / 40 mg/m(^3)</td>
<td>202.5 mg/m(^3)</td>
</tr>
<tr>
<td>Fuel Oil #6</td>
<td>Inhalation of vapors can cause headache and stupor. Ingestion effects are the irritation of the stomach and GI tract, nausea, and vomiting. (HC)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Gas Oil</td>
<td>Acute: may cause slight eye irritation. May have slight toxicity by ingestion, aspiration hazard causing pneumonitis. Inhalation may cause drowsiness or narcosis. Primary skin irritant. (C)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Gasoline</td>
<td>At 50-100 octane, exposure to skin causes dermatitis and blistering. Inhalation and ingestion effects include CNS depression, pulmonary aspirations leading to severe pneumonitis. Even brief inhalation can lead to fatal pulmonary edema. Asphyxiant. (S)</td>
<td>890 mg/m(^3)</td>
<td>-</td>
</tr>
<tr>
<td>Hexane</td>
<td>Harmful by inhalation, dermal contact, and ingestion. Eye and respiratory tract irritant.</td>
<td>1800 mg/m(^3) / 1760 mg/m(^3)</td>
<td>3883 mg/m(^3) (10% of LEL)</td>
</tr>
<tr>
<td>Substance</td>
<td>Acute Effects</td>
<td>Chronic Effects</td>
<td>NIOSH RELs</td>
</tr>
<tr>
<td>-----------</td>
<td>---------------</td>
<td>----------------</td>
<td>-----------</td>
</tr>
<tr>
<td>Hydrochloric Acid, solution</td>
<td>Dermal contact, burns, dermatitis, permanent eye damage. Inhalation: cough, choking, inflammation and ulceration of the respiratory tract. Ingestion: corrosion of the mucous membranes and GI tract. May be fatal if swallowed. (S) (M)</td>
<td></td>
<td>c 7.45 mg/m$^3$ 74.5 mg/m$^3$</td>
</tr>
<tr>
<td>Hydrofluoric Acid, solution</td>
<td>Extremely irritating and corrosive to the skin and mucous membranes causing severe burns, eye damage could be permanent. Inhalation of vapors cause extreme irritation of the respiratory tract, pulmonary inflammation, and congestion. Ingestion: necrosis of esophagus and stomach with nausea, vomiting, diarrhea, circulatory collapse, and death. Chronic: fluorosis. (M) (S)</td>
<td></td>
<td>c 2.46 mg/m$^3$ / 2.3 mg/m$^3$ 24.6 mg/m$^3$</td>
</tr>
<tr>
<td>Hydrogen</td>
<td>Inhalation: asphyxiant. (M)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydrogen Sulfide</td>
<td>Extremely hazardous. Acute: collapse, coma, and death from respiratory failure may come within a few seconds after one or two aspirations. Low concentrations produce irritation of conjunctiva and mucous membranes, headaches, dizziness, nausea. (M)</td>
<td></td>
<td>c 28 mg/m$^3$ / 7 mg/m$^3$ 140 mg/m$^3$</td>
</tr>
<tr>
<td>Iron (Fe) Oxide</td>
<td>Inhalation: benign pneumoconiosis (N)</td>
<td></td>
<td>10 mg/m$^3$ / 5 mg/m$^3$ 2500 mg/m$^3$ as Fe</td>
</tr>
<tr>
<td>Kerosene</td>
<td>Inhalation of vapors can cause headache and stupor. Ingestion effects are irritation of the stomach and GI tract, nausea, and vomiting. (S)</td>
<td></td>
<td>100 mg/m$^3$ NIOSH REL/ skin</td>
</tr>
<tr>
<td>Lead Chromate</td>
<td>Potential carcinogen. CNS effects. (N)</td>
<td></td>
<td>0.05 mg/m$^3$ as Pb / 0.012 mg/m$^3$ as Cr</td>
</tr>
<tr>
<td>Lead Oxide</td>
<td>Potential carcinogen. CNS effects. (N)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liquefied Petroleum Gas</td>
<td>Acute: Ingestion: B53 irritation. Inhalation: asphyxiant. May cause headache, dizziness, drowsiness, excitation. Skin exposure may cause frostbite. (C) (HC)</td>
<td></td>
<td>1800 mg/m$^3$</td>
</tr>
<tr>
<td>Mercury (Hg)</td>
<td>Acute: bronchitis, chest pain, dyspnea, gingivitis, GI disturbances. Inhalation of high levels of mercury vapor can lead to severe respiratory irritation and death. Chronic: central nervous system toxicity, kidney damage. (A) (I)</td>
<td></td>
<td>c 0.1 mg/m$^3$ / 0.025 mg/m$^3$ skin 10 mg/m$^3$ as Hg</td>
</tr>
<tr>
<td>Methane</td>
<td>Acute: Inhalation: dizziness, deep breathing due to air hunger, possible nausea and eventual unconsciousness. Asphyxiant. (C)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Naphtha</td>
<td>Acute: Inhalation: unconsciousness leading to coma, restricted breathing, recovery upon removal. Chronic: headaches, loss of appetite, dizziness, sleeplessness, indigestion, nausea. (S)</td>
<td></td>
<td>400 mg/m$^3$ / 1590 mg/m$^3$ 4500 mg/m$^3$ (10% LEL)</td>
</tr>
<tr>
<td>Natural Gas</td>
<td>Eye and skin irritation. Asphyxiant. (HC)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nickel (Ni)</td>
<td>Carcinogen by inhalation. Acute: nausea, vomiting, diarrhea, allergic contact dermatitis, asthma, conjunctivitis. Chronic: dermatitis, irritation, metallic taste, nausea, tightness of chest, fever, loss of coordination.</td>
<td></td>
<td>c 1 mg/m$^3$ / 1.5 mg/m$^3$ 10 mg/m$^3$ as Ni</td>
</tr>
<tr>
<td>N-Methyl-di-ethanolamine</td>
<td>Eye, nose, skin, ingestion irritation, redness. (S)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

000156
<table>
<thead>
<tr>
<th>Substance</th>
<th>Acute Effects</th>
<th>Exposure Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pentane</td>
<td>Acute: vapor mist is irritating to the eyes, mucous membranes and upper respiratory tract. Narcotic in high concentrations. Dermal blisters upon contact. (S)</td>
<td>2950 mg/m³ / 1770 mg/m³ / 4425 mg/m³ (10% LEL)</td>
</tr>
<tr>
<td>Platinum (Pt)</td>
<td>Acute: inhalation of dust is irritating, causing wheezing, coughing, cyanosis, shortness of breath, tightness of chest. Dermal contact can cause dermatitis. Ingestion: none known. (M)</td>
<td>- / 1 mg/m³ as Pt</td>
</tr>
<tr>
<td>Potassium Hydroxide</td>
<td>Extremely corrosive. Acute: ingestion may cause violent pain in throat and epigastrium, collapse. If not immediately fatal, stricture of the esophagus may develop. (M)</td>
<td>- / c 2 mg/m³</td>
</tr>
<tr>
<td>Propane</td>
<td>Asphyxiant. High concentrations can cause CNS effects. (S)</td>
<td>1800 mg/m³ / 4508 mg/m³ / 10,080 mg/m³ (10% LEL)</td>
</tr>
<tr>
<td>Propylene</td>
<td>Asphyxiant. Headache, drowsiness, vomiting, eye, and skin irritation. The liquid form burns the skin. (S)</td>
<td>- -</td>
</tr>
<tr>
<td>Rhenium</td>
<td>May be harmful if inhaled. Ingestion/skin absorption. Eyes/skin: may cause irritation. (M)</td>
<td>- -</td>
</tr>
<tr>
<td>Sodium Carbonate</td>
<td>Acute: Dusts causes irritation of eyes and respiratory tract. Prolonged contact with the skin leads to local irritation. Ingestion of large amounts may result in damage to the gastrointestinal tract, vomiting, and diarrhea. (M)</td>
<td>15 mg/m³ (Mfr.)</td>
</tr>
<tr>
<td>Sodium Chromate</td>
<td>Acute: severe eye, nose, mouth, throat, stomach irritation, corrosive, severe burns and scarring possible, vomiting, diarrhea. (S)</td>
<td>- -</td>
</tr>
<tr>
<td>Sodium Hydroxide</td>
<td>Acute: corrosive, severe eye and nose irritation, severe burns and scarring possible, vomiting, diarrhea. (S)</td>
<td>c 2 mg/m³ / 10 mg/m³</td>
</tr>
<tr>
<td>Sulfur Dioxide</td>
<td>Yellowing of skin. Blistering of mucous membranes. Eye, nose, and throat irritation, sneezing, cough, tearing. Can cause edema of the lungs or glottis, respiratory paralysis. (S)</td>
<td>13 mg/m³ / 5.2 mg/m³ / 262 mg/m³</td>
</tr>
<tr>
<td>Sulfuric Acid</td>
<td>Corrosive to all body tissues. Inhalation causes lung damage, contact with eyes may result in loss of vision, dermal contact may result in severe necrosis. Ingestion causes severe injury and death. (M)</td>
<td>1 mg/m³ / 15 mg/m³</td>
</tr>
<tr>
<td>Tetraethyl Lead (Pb)</td>
<td>Convulsions, dizziness, headache, unconsciousness, vomiting, weakness. May be absorbed through the skin. (S)</td>
<td>0.075 mg/m³ / 0.1 mg/m³ / 40 mg/m³ as Pb</td>
</tr>
<tr>
<td>Toluene</td>
<td>Acute fatigue, confusion, euphoria, dizziness, headache, tears. Skin and eye irritant, CNS effects. (S)</td>
<td>754 mg/m³ / 188 mg/m³ / 1885 mg/m³</td>
</tr>
<tr>
<td>Vanadium (V) Pentoxide</td>
<td>Respiratory irritant, causes skin pallor, greenish-black tongue, chest pain, cough, dyspnea, palpitation, lung changes. Ingestion causes GI disturbances. (M)</td>
<td>c 0.05 mg/m³ (dust) / 35 mg/m³ as V</td>
</tr>
<tr>
<td>Xylenes</td>
<td>Acute: dyspnea, nose, skin, and throat irritation, nausea, vomiting, CNS depression. Chronic: liver and kidney toxicity, tremors, labored breathing. (A)</td>
<td>435 mg/m³ / 434 mg/m³ / 3906 mg/m³</td>
</tr>
</tbody>
</table>

Key:

1 - Values are for the Occupational Safety and Health Administration's permissible exposure limits (PELs) and the American Conference Governmental Industrial Hygienists' threshold limit values (TLVs). If only one value is given, then the exposure limit is the same for both organizations (ACGIH, 2000).

2 - IDLH, Immediately dangerous to life and health, National Institute for Occupational Safety and Health (NIOSH, June 1997).
Asphyxiant - gases of this type have no specific toxicity effect, but they act by excluding oxygen from the lungs.

<table>
<thead>
<tr>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>HC - Department of Transportation, United States Coast Guard, Chemical Hazard Response Information System (CHRIS), November 1994.</td>
</tr>
</tbody>
</table>
CHEMICALS

- Alumina
- Aminoethanol
- Ammonia
- Ammonium Hydroxide
- Ammonium Sulfamate
- Ammonium Sulfide
- Ammonium Sulfite
- Arsenic
- Benzene
- Boron
- Butane
- Cadmium
- Calcium Fluoride
- Calcium Hypochlorite
- Carbon Dioxide
- Cobalt
- Crude Oil
- Diesel Fuel Oil
- Diethanolamine
- Diisopropanol-amine
- Diisopropylamine
- Ethane
- Ethyl Benzene
- Ethyl Mercaptan
- Ethylene Dichloride
- Fuel Oil #6
- Gas Oil
- Gasoline
- Hexane
- Hydrochloric Acid, Solution
- Hydrofluoric Acid
- Hydrogen
- Hydrogen Sulfide
- Iron Oxide
- Kerosene
- Lead Chromate
- Lead Oxide
- Lead Sulfide
- Lead Sulphate
- Liquefied Petroleum Gas
- Mercury
- Methane
- Molybdenum
- Naptha
- Nickel Oxide
- N-Methyl-di-ethane
- Pentane
- Phosphoric Acid
- Platinum
- Potassium Flouride
- Potassium Hydroxide
- Propane
- Propylene
- Radioactive Isotopes
- Rhenium
- Soda Ash
- Sodium Chromate
- Sodium Hydroxide
- Sodium Sulfate
- Sodium Sulfide
- Sodium Sulfite
- Sulfur Dioxide
- Sulfuric Acid
- Tetraethyl Lead
- Toluene
- Vanadium Pentox
- Xylene
MEMORANDUM

SUBJECT: Request for Approval of a Consistency Exemption to the Statutory Two Million Dollar Limit for the Conduct of a Time Critical Removal Action at the Oklahoma Refining Company Site, Cyril, Caddo County, Oklahoma

FROM: Rita M. Engblom, On-Scene Coordinator
Response and Prevention Branch (6SF-R1)

THRU: Charles A. Gazda, Chief
Response and Prevention Branch (6SF-R)

TO: Myron O. Knudson, P.E., Director
Superfund Division (6SF)

1. Purpose

The purpose of this memorandum is to request and document approval of a Time Critical Removal Action and exemption to the statutory two million dollar limit imposed by Section 104 (c) (1) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), 42 U.S.C. §9601 et seq. and §9604 (c) (1), for the Oklahoma Refining Company (ORC) site located on the Cyril, Caddo County, Oklahoma. The basis for the request for exemption from this statutory limitation is that the proposed action is necessary, otherwise appropriate, and consistent with future remedial actions to be taken at the site.

The objective of this proposed removal action is to remove or eliminate principal hazardous wastes, thereby eliminating or reducing risks from potential waste exposure pathways, at the site. The ORC site was placed on the Nation Priorities List (NPL) on February 21, 1990. However, the refinery process area (ORC North) was not considered in the Remedial Investigation (RI) and subsequent Remedial Action, since it was active and under Resource Conservation and Recovery Act (RCRA) enforcement at that time. The specific areas of ORC North to be addressed in this removal action are the: 1) Superstructures/refinery process units containing potential hazardous chemicals and substances; and 2) miscellaneous items, including above-ground storage tanks (ASTs), sumps, cooling towers and structurally unsafe buildings. The specific objectives for the Time Critical Removal Action, are: 1) To protect human health and the environment from the release of volatile organic compounds (VOCs) and toxic liquids from the refinery superstructure to air, soil, and ground water; 2) to protect human health from