

GW - 032

Bio-Hazard Plan

2009 - Present

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February 27, 2009

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Oil Conservation Division
Environmental Bureau
1220 S. St. Francis Dr.
Santa Fe, NM 87505

Hope Monzeglio
New Mexico Environment Department
Hazardous Waste Bureau
2905 Rodeo Park Drive East, Building 1
Santa Fe, NM 87505-6303

Re: OCD Discharge Permit GW-032 Condition 24

Dear Mr. Jones and Ms. Monzeglio:

This letter and submission address the OCD Discharge Permit GW-032 Condition 24 requirements. Specifically the below listed items address the OCD GW-032 revised schedule letter dated March 12, 2008, which granted a submission due date of March 1, 2009.

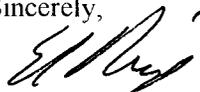
Condition 24 A. and B. - A letter and final design drawings were sent to Carl Chavez on January 26, 2009 requesting additional time needed to complete the Pilot Travel Center lift station. Gallup is progressing with the new Pilot Travel Center lift station/underground line design that OCD approved in the fourth quarter of 2008 and is expected to be completed by June 13, 2009.

The two new four inch underground sewer lines were installed and pressure tested in December 2008 to demonstrate mechanical integrity. The existing line is still in use but a few piping modifications completed in February allow the wastewater to be transferred over to one of the new lines should a problem arise with the existing line. This will assure there will be no bypass to the evaporation pond.

Condition 24. E. - the *Biohazard Management Plan* is attached. This comprehensive plan covers the waste treatment facility and evaporation ponds. As requested by OCD a copy of the plan is also being sent to Heidi Krapsi, Bureau Chief, Environmental Epidemiology, NM Department of Health.

Please contact me at (505) 722-0217 if you have any comments or questions regarding this submittal.

Sincerely,



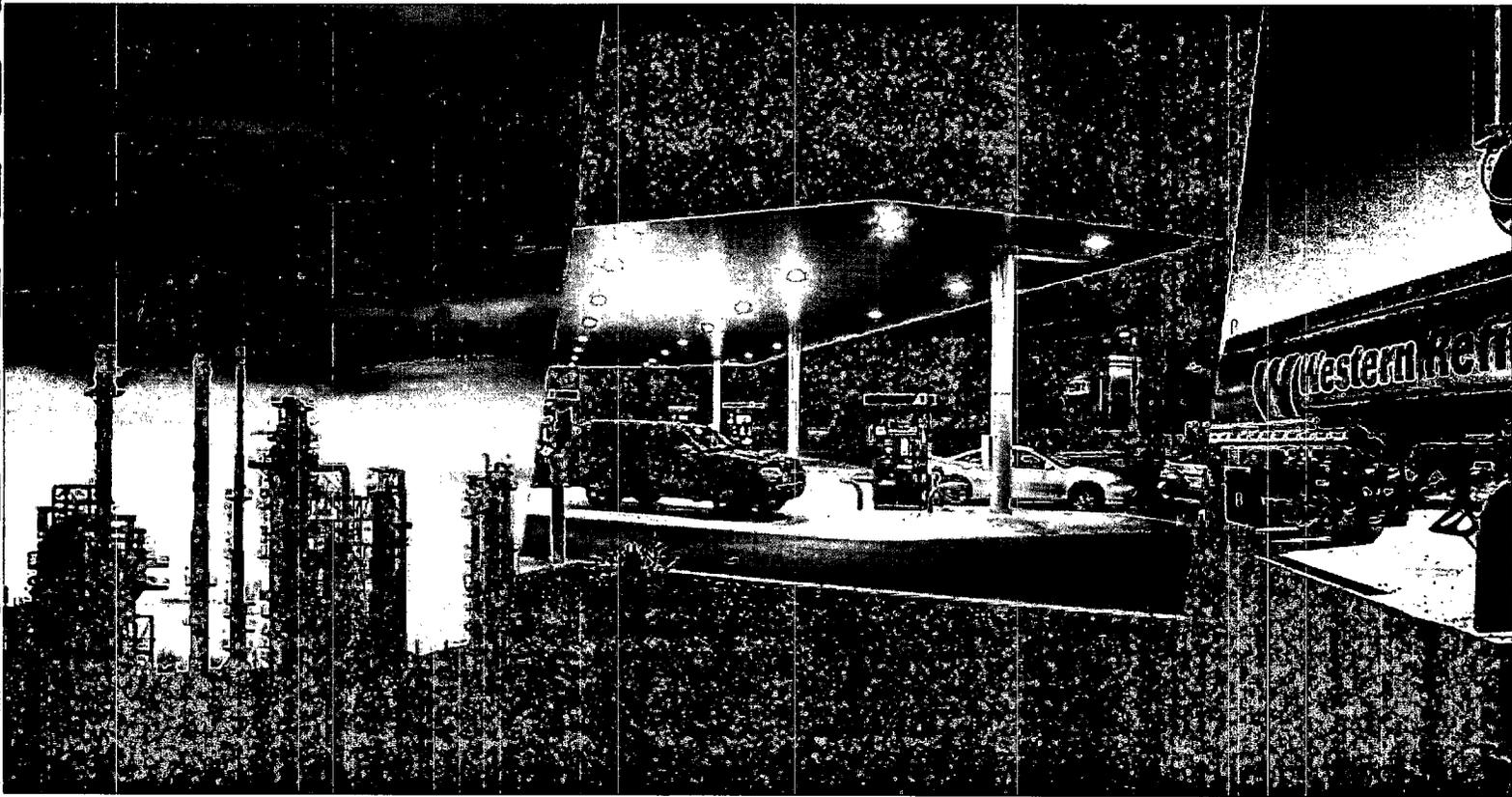
Ed Riege MPH
Environmental Manager

C: Heidi Krapsi

Biohazard Management Plan Wastewater Treatment Plant Gallup Refinery

**Western Refining
Gallup, New Mexico**

March 2009

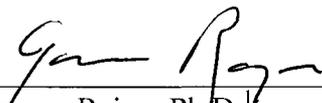


**Biohazard Management Plan
Wastewater Treatment Plant
Gallup Refinery**

**Western Refining
Gallup, New Mexico**

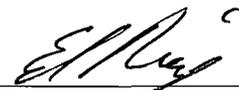
March 2009

Prepared by:



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Reviewed by:



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Environmental Manager

¹ Dr. Gaurav Rajen is an environmental engineer with several decades of experience who has conducted numerous assessments of risks from hazardous, radioactive, and biological wastes, worked closely with the U.S. Environmental Protection Agency and the Agency for Toxic Substance and Disease Registry on such assessments, and published extensively in these fields. He has supported Sandia National Laboratories' International Biological Threat Reduction Program and co-authored a report related to bio-security and bio-safety in South Asia. He was a speaker at the Biological Threat Reduction conference in 2005 sponsored by the State of New Mexico's Department of Homeland Security and Emergency Management.

² Mr. Ed Riege has several decades of experience in assessing environmental risks, including biological risks, and also hold a Master's degree in Public Health from Loma Linda University.

Abstract

We have created a Biohazard Management Plan that addresses possible risks from biohazards at the Gallup Refinery's Wastewater Treatment Plant (WWTP). We have assessed risks through literature reviews, independent analyses, and review of our monitoring data. To manage the most significant risks (in absolute terms the risks are low, but could have severe consequences), we have created a system of engineering practices and controls, physical protective equipment, and the use of specialized containers to temporarily store, and later transport and dispose any infectious wastes that could enter our WWTP. We find that environmental risks from the attraction of vectors (such as rodents or birds) to our biomaterials are minimized by virtue of the Aggressive Biological Treatment we utilize to treat our wastewater. Through our plan, we are in conformity with recommendations of the U.S. Environmental Protection Agency and the New Mexico Environment Department, as well as requirements related to blood-borne pathogens and other infectious materials required by the Occupational Safety and Health Administration.

Executive Summary

This "Biohazard Management Plan" addresses the potential biohazards present in the wastewater treatment plant (WWTP) of the Gallup Refinery of Western Refining. To develop this Biohazard Plan, we have first assessed risks from our WWTP's biohazards. Our major findings are -

- On-site risks from biohazards to workers at the refinery's WWTP in terms of health effects are a small but finite possibility – therefore, we have created a series of management controls to minimize these risks, including the use of appropriate physical protective equipment, an immunization program, and training. There are risks to WWTP workers from sharps (such as needles, etc.) contaminated with infectious wastes. As the consequences could be severe, we plan to keep on-site specially designed containers for infectious wastes and utilize existing programs of the State of New Mexico for disposal of sharps or other authorized infectious waste handlers. (Risks to any inadvertent intruder are estimated far lesser than the risks to on-site workers and risks to inadvertent intruders are found to not be of any appreciable concern.)
- Risks from airborne bioaerosols are shown to be the only route for risks from off-site exposures. Levels of bioaerosols from WWTPs are known to drop off to background after about 300 m. The nearest permanent residents are located 3000 m away. Other population centers are the Pilot Travel Center, and the Interstate-40 corridor which have workers and transient visitors. Both of these transient population centers are greater than 600 m away. As the distances to population centers are much greater than 300 m, we do not anticipate any risks from bioaerosols to these residents and transient visitors.
- Environmental risks are minimized by making our wastewater and sludge unattractive to vectors (such as rodents or birds).

Based on these assessments of risks and identification of risks that need to be minimized, we have created a detailed plan to manage risks and control exposures. Our plan conforms to the operational requirements mandated by the State of New Mexico's Solid Waste Regulations regarding infectious wastes that require the creation of a management plan for all WWTPs that might handle infectious wastes (regardless of quantity).

We have created a management plan with engineering practices and controls as well as physical protective equipment to manage and control likely biohazards at the Gallup Refinery. We offer an immunization program for employees who work with wastewater, and have coupled this with enhanced training, ongoing medical evaluations, and record-keeping. We will continually update this plan as needed. The persons responsible for the implementation and oversight of this plan are:

Refinery Manager

- Mark Turri

Operations Manager – Off-sites (oversees the WWTP)

- Joel Quinones

Health and Safety Manager

- Frank Deller

Environmental Manager

- Ed Riege

Training Coordinator – Off-sites

- Kelly Sanchez

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LIST OF ACRONYMS

ATSDR	Agency for Toxic Substances and Disease Registry
CDC	Centers for Disease Control
CFU	Colony forming units
EPA	Environmental Protection Agency
GPM	Gallons per minute
GPD	Gallons per day
HBV	Hepatitis B Virus
HIV	Human Immunodeficiency Virus
NMED	New Mexico Environment Department
OCD	Oil Conservation Division
OSHA	Occupational Safety and Health Administration
PPE	Physical protective equipment
WWTP	Wastewater treatment plant

Chapter 1

1.0 Introduction

This “Biohazard Management Plan” (Biohazard Plan) is submitted pursuant to the requirements of the New Mexico Energy Minerals and Natural Resources Department’s Oil Conservation Division (OCD) Groundwater Discharge Permit issued August 23, 2007 to the Gallup Refinery of Western Refining. The plan essentially addresses the potential biohazards present in the wastewater treatment plant (WWTP) of the Gallup Refinery.

In this plan, we begin by first assessing all of the potential biohazards posed by the industrial and sanitary wastewater treatment system of the Gallup Refinery. Through this assessment, we identify the major biohazards of concern. We then present a set of management actions that will be used to control these biohazards.

The biohazards at the wastewater treatment system arise from the wastewater generated from the refinery’s operations and also from the fact that the wastewater treatment system accepts sanitary effluents from the Pilot Travel Center. The Pilot Travel Center is a truck stop, with a convenience store and restaurants, located adjacent to the Gallup Refinery. Figure 1 depicts a satellite image of the general location of the Gallup Refinery and the Pilot Travel Center.

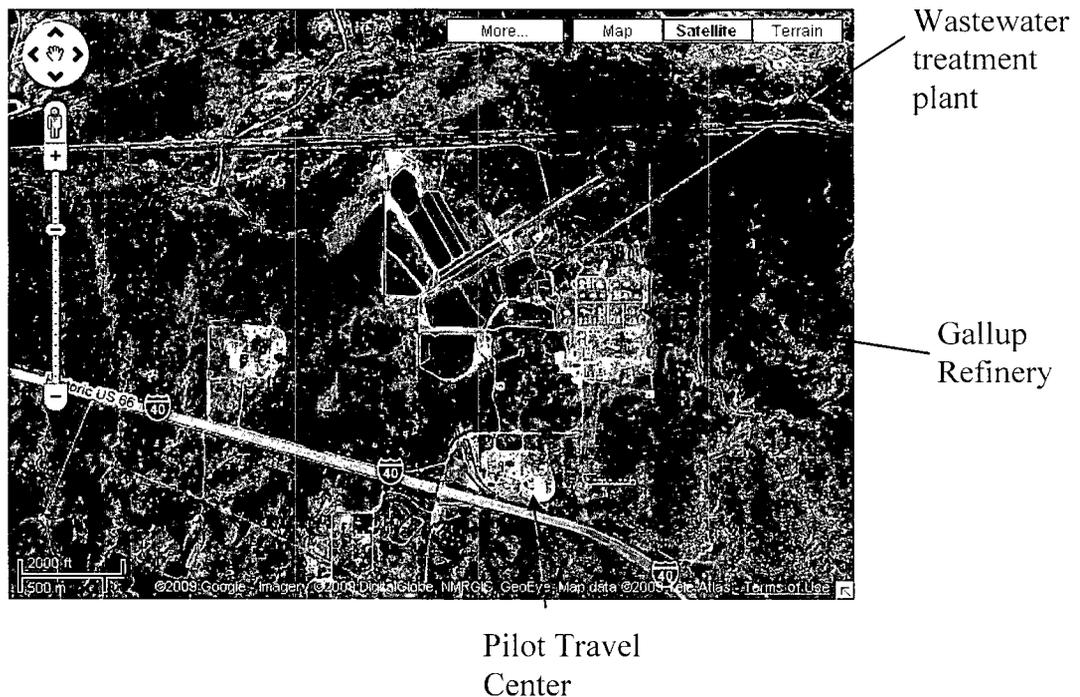


Figure 1: General locations of the Gallup Refinery and the Pilot Travel Center (both are located adjacent to Interstate-40, about 17 miles east of Gallup)

1.1 What is a Biohazard?

Generally, the term “biohazard” refers to blood-borne pathogens, as well as other materials that have the potential to cause infections such as bodily fluids, human and animal tissues, etc. Biohazards also include “sharps”, which could be in the form of used/unused needles, scalpels, broken glass, etc., that have been exposed to pathogens and that can cause cuts to handlers of such sharps. Health-related wastes that have been exposed to any such materials are also termed biohazards.

The term biohazard has several explicit definitions developed by various government agencies, differing in part on the specific interests of the agency.

The Occupational Safety and Health Administration (OSHA) of the U.S. Department of Labor defines (in 29 CFR 1910.145 (f) (2)) a "Biological hazard" or "BIOHAZARD" as “those infectious agents presenting a risk of death, injury or illness to employees”.

OSHA has also created regulations that specifically govern bloodborne pathogens and other potentially infectious materials in 29 CFR 1910.1030. These regulations define the following –

- **“Bloodborne Pathogens** means pathogenic microorganisms that are present in human blood and can cause disease in humans. These pathogens include, but are not limited to, hepatitis B virus (HBV) and human immunodeficiency virus (HIV).
- **Other Potentially Infectious Materials** means (1) The following human body fluids: semen, vaginal secretions, cerebrospinal fluid, synovial fluid, pleural fluid, pericardial fluid, peritoneal fluid, amniotic fluid, saliva in dental procedures, any body fluid that is visibly contaminated with blood, and all body fluids in situations where it is difficult or impossible to differentiate between body fluids; (2) Any unfixed tissue or organ (other than intact skin) from a human (living or dead); and (3) HIV-containing cell or tissue cultures, organ cultures, and HIV- or HBV-containing culture medium or other solutions; and blood, organs, or other tissues from experimental animals infected with HIV or HBV.”

These OSHA regulations require all employers whose employees might suffer (regardless of Personal Protective Equipment) exposure to bloodborne pathogens or other potentially infectious materials to carry out an exposure determination and create an exposure control plan. The current Health and Safety Plan of the Gallup Refinery and the Policies and Procedures for Personal Protective Equipment required of all employees meet the requirements of the OSHA regulations related to bloodborne pathogens and other potentially infectious materials. This Biohazard Plan augments these existing documents by creating additional controls for all potential biohazards that our WWTP workers may get exposed to.

The Centers for Disease Control (CDC) defines a biohazard as –

“An agent of biological origin that has the capacity to produce deleterious effects on humans, i.e. microorganisms, toxins and allergens derived from those organisms; and allergens and toxins derived from higher plants and animals.”¹

A search of the web site of the State of New Mexico’s Department of Health, Bureau of Health Emergency Management, and a review of various documents developed by this organization establishes that the State of New Mexico interprets the term biohazard in the sense that OSHA and the CDC define this term. For example, in guidance developed by the New Mexico Department of Health on packaging, labeling and shipping of infectious substances, the section on labeling requires a “biohazard” label to be affixed for US Postal Service shipments of infectious substances.² This label (shown in Figure 2) is what is used for biohazards as defined by OSHA and the CDC

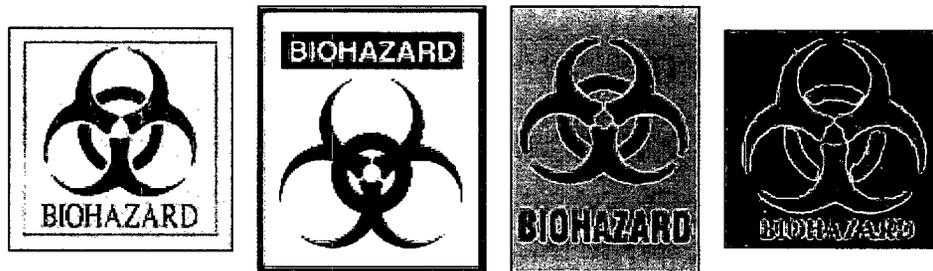


Figure 2: Commonly used labels for “biohazards”

The New Mexico Environment Department (NMED) also equates infectious waste with biohazards. In its Solid Waste regulations, for example, the NMED states that -
“Vehicles transporting *infectious* waste shall be identified on each side of the vehicle with the name or trademark of the commercial hauler, the environment department registration number, and a biohazard symbol (20.9.5 NMAC 76). (Emphasis added.)

Further, in regulations regarding Solid Waste³ the NMED defines infectious wastes as –

- "infectious waste" means a limited class of substances that carry a probable risk of transmitting disease to humans, including but not limited to:
 - microbiological laboratory wastes, including cultures and stocks of infectious agents from clinical research and industrial laboratories, and disposable culture dishes and devices used to transfer, inoculate and mix cultures;

- pathological wastes, including human or animal tissues, organs and body parts, removed during surgery, autopsy or biopsy;
- disposable equipment, instruments, utensils, and other disposable materials which require special precautions because of contamination by highly contagious diseases;
- human blood and blood products, including waste blood, blood serum, and plasma;
- used sharps, including used hypodermic needles, syringes, scalpel blades, Pasteur pipettes and broken glass; and
- contaminated animal carcasses, body parts and bedding, especially those intentionally exposed to pathogens in research, in the production of biologicals or the "in vivo" testing of pharmaceuticals;"

The NMED regulations regarding infectious waste apply, without regard to the quantity of infectious waste produced, to all infectious waste storage, treatment, and disposal facilities.

The U.S. Environmental Protection Agency (EPA) has a broader definition of biohazards than OSHA, the CDC, and that adopted by the NMED. The EPA includes environmental risks in its assessment of biohazards. The EPA has created the Biohazard Assessment Research Branch (BARB) of the Microbiological & Chemical Exposure Assessment Research Division, National Exposure Research Laboratory that operates within the Office of Research and Development. "The Branch conceives, plans organizes, and conducts research that is designed to identify measure and characterize microbial pathogens that are transmitted through water, soil, and air.... The primary emphasis within this mission is the development and evaluation of practical and economical technology that will permit rapid, sensitive, and specific biohazard assessment of the environment with emphasis on risk to human health. Determining the occurrence, distribution, transport, and fate of human pathogenic microbes through the implementation and propagation of analytical procedures permits the Branch to establish data bases that can link environmental exposure of populations to microbial diseases."⁴

Along with the direct risks to human health from exposure, the EPA is concerned with risks from vectors (such as rodents) that could be attracted to a wastewater treatment system's sludge and other biomaterials.⁵ Such vectors could subsequently spread any potential biohazards present in the biomaterials emanating from the WWTP. The EPA is also concerned with the risks posed by the cross-species transfer of human pathogens and thus impacts to animal species other than human.

Most facilities that routinely generate and handle biohazards develop their own definitions of the term biohazard (usually combining the OSHA/CDC and the EPA approaches). For example, the University of Illinois at Urbana-Champaign defines the term biohazard to include "agents presenting a risk or potential risk to the well-being of man or animals, either directly through

infection or indirectly through disruption of the environment.”⁶ We adopt this definition in our Biohazard Plan, and consider both infectious and environmental risks in assessing risks from biohazards.

1.2 Brief Description of the Gallup Refinery’s Wastewater Treatment Plant and Associated Biohazards

The Gallup Refinery is a crude oil refinery with an approximate refining capacity of 23,000 barrels per day. Various process units are operated at the facility, including crude distillation, reforming, fluidized catalytic cracking, alkylation, isomerization, sulfur recovery, merox treater, and hydrotreating. Current and past operations have produced gasoline, diesel fuels, jet fuels, kerosene, propane, butane, and residual fuel.

The refinery generates approximately 100-200 gallons per minute (gpm) of industrial wastewater, or approximately 144,000 – 288,000 gallons per day (gpd). It is important to note that some streams of the refinery’s wastewater have often undergone a variety of industrial operations in process units that are hostile to biological growth, such as high temperatures, rapid changes in pH, etc. However, we do not discount the fact that biomaterials may be present in the industrial wastewater.

To the refinery’s industrial wastewater is added the sanitary effluent of the Pilot Travel Center which is at a flow rate of the order of 20-40 gpm, or 28,800 – 57,600 gpd. The Pilot Travel Center is not connected to a hospital or a clinic and so does not routinely generate hospital-related wastes and materials such as sharps. A new lift-station with a filter screen is being constructed to bring this sanitary effluent to the Gallup Refinery’s WWTP. The filter screen has an automated system for removing sludge particles that are cleaned off through a rotary system and placed into a bag and drum for subsequent disposal. As this location has the highest probability of having sharps present, special care will be taken to train our WWTP workers in the handling of such sharps and in providing them adequate protection. (This issue is discussed in more detail in Chapter 3.)

The combined streams of the industrial wastewater and the Pilot Travel Center’s sanitary effluents are treated in a series of two aeration lagoons where they undergo Aggressive Biological Treatment through the action of five aerators that operate continuously. The treated wastewater then enters a series of evaporation ponds. Wastewater from a Reverse Osmosis unit at a flow rate of approximately 60 gpm enters into the second pond. This wastewater from the Reverse Osmosis unit does not contain sanitary effluents, further diluting the sanitary effluents that have come from the Pilot Travel center into the WWTP.

Raw sewage and WWTPs can contain a variety of disease organisms including bacteria, viruses, fungus, worms and protozoa. Table 1 lists some of the organisms that may be found in wastewater containing raw sewage and the symptoms caused by exposure to these organisms.⁷ This is an illustrative list – it is not a complete list of all pathogenic organisms that might be contained in sewage. Although only about sixteen percent of the Gallup Refinery’s wastewater stream contains sanitary effluents, organisms present in raw sewage are likely present in the Gallup Refinery’s WWTP.

Table 1: Organisms that May Be Found in WWTPs or Sewage (illustrative list – not complete)

Organism	Signs & Symptoms	Average Latency Period
<i>Bacteria</i>		
Salmonella	Nausea, headache, diarrhea and vomiting; almost always with a fever.	6 to 72 hours
Tetanus (lockjaw)	Muscular stiffness in jaw, neck. Sweating, fever, difficulty swallowing.	8 days
Shigella	Cramps, diarrhea, fever, bloody stool, nausea, vomiting.	1 to 3 days
Leptospirosis (Weil's Disease)	Intestinal problems, liver and kidney disease, jaundice.	4 to 10 days
E. coli	Diarrhea, vomiting, little or no fever, blood often seen in stool.	Approximately 3 days
<i>Viruses</i>		
Hepatitis A	Fever, abdominal pain, nausea, jaundice, dark-colored urine.	Approximately 30 days
Hepatitis B	Nausea, vomiting, loss of appetite, jaundice, joint pain.	60 to 90 days
Hepatitis C	Develops slowly, loss of appetite, stomach pain, nausea and vomiting. Jaundice is less common.	6 to 9 weeks
HIV	Destroys immune system, prone to opportunistic infections.	1 to 2 years
<i>Parasites</i>		
Entameoba histolytica (amebiasis)	Mild nausea, loose stool, abdominal tenderness. In severe cases can spread throughout the body and attack other organs, especially the liver.	14 to 28 days
Giardia lamblia	Cramps, weight loss, loose/greasy stool, bloating. Fever is rare.	

The major routes of exposure to such organisms are –

- Oral, primarily from hand-to-mouth contact
- Skin absorption (unlikely unless the skin has been damaged by cuts, etc.)
- Inhalation of bioaerosols (i.e. aerosols containing microorganisms)
- Mucous membranes (such as in the eyes or nose)
- Parenteral, that is piercing of the skin or mucous membranes by sharps, etc.

1.3 Scope of this Biohazard Plan

In this Biohazard Plan, to assess risks from the WWTP's biohazards our approach is as follows:

- We assess on-site risks from biohazards to workers at the refinery's WWTP, as well as to an inadvertent intruder
- We assess off-site risks to nearby residents
- We assess environmental risks

Based on these assessments we then present a detailed plan to manage these risks and control exposures.

Our plan conforms to the operational requirements mandated by the State of New Mexico's Solid Waste Regulations regarding infectious wastes that require the creation of a management plan for all WWTPs that might handle infectious wastes (regardless of quantity).

Chapter 2

2.0 Assessment of Biohazards

2.1 On-site Exposures - Workers and an Inadvertent Intruder

Numerous detailed studies have considered the risks from biohazards to WWTP workers and have not found higher infection rates for sewage workers compared to similar populations of workers not exposed to sewage. Our WWTP workers will be dealing with lesser and more dilute quantities of sewage than those in large municipal WWTPs. Therefore, we expect that the health effects of dealing with sewage will be even lesser for the WWTP workers of the Gallup Refinery.

A detailed review of a large number of health studies of WWTP workers is available in a paper by R.J. McCunney (published in the American Journal of Industrial Medicine) that surveys the literature on health effects of working at sewage plants and provides guidelines for medical surveillance.⁸ One of the studies described in this paper over one year found no difference in the rates of parasitic organism infections between 125 sewage workers and 125 highway workers. Another study involving 150 wastewater treatment workers found no cases of polio, salmonellosis, leptospirosis, shigellosis, typhoid fever, hepatitis A, giardiasis or amoebiasis.⁹

Although the above-referenced studies have considered health risks to workers at WWTPs, other studies have measured the air concentrations of bioaerosols at WWTPs and compared these with standards for occupational exposures. At WWTPs, the air concentrations of bioaerosols are generally highest at locations such as incoming wastewater inlets, aeration lagoons, and sludge treatment areas.¹⁰ At a city of 160,000 people in Poland, samples were collected at nine critical locations within the sewage plant and three at different locations in the city.¹¹ At this sewage treatment plant, the study found the concentrations of total mesophilic bacteria (both Gram-positive and Gram-negative) were within a range of $2.4-70.7 \times 10^2$ colony forming units (cfu)/m³. Altogether, 20 potentially pathogenic species or genera of bacteria and fungi were identified in the air samples taken in the examined plant. The values of the respirable fraction of airborne microflora varied within a fairly wide range and were between 24.1-100%. The concentrations of airborne endotoxin were in the range of 0.104-5.2 ng/m³. The conclusions of this study, which are representative of those determined by other similar studies, are that the concentrations of microorganisms and endotoxin in the examined municipal sewage treatment plant were low and did not exceed occupational exposure limit values. No treatment units were within enclosed spaces at this WWTP. The refinery's WWTP also does not have any enclosed areas in which treatment units are located. We believe the conclusions of this study are applicable to the Gallup Refinery's WWTP.

It should be noted that the Pilot Travel Center's sanitary effluents are not as concentrated in bio-solids as is generally the case for WWTPs that handle municipal wastewater. For example, we have found that the levels of Volatile Suspended Solids in the Pilot Travel Center's effluent are of the order of 75 ppm¹²; as compared to levels generally accepted to be typical of domestic sewage which are of the order of 240 ppm.¹³ Therefore, our WWTP workers will be at less risk

than workers in a municipal WWTP - the Pilot Travel Center effluent is less concentrated to begin with and further diluted by non-sewage containing wastewater.

2.1.1 Assessment of Risks to Workers from Hazardous Health-care Waste

The Pilot Travel Center does not have a connection to a health facility or a clinic. However, there is a possibility of customers disposing off hazardous health-related wastes (as well as other wastes of a similar nature, such as needles contaminated with human blood from intravenous drug users). Therefore, we evaluate in this section the risks that could result from exposure to such wastes at the Gallup Refinery's WWTP.

In a survey of occupational exposure of waste industry workers in Washington State, W.L. Turnberg and F. Frost found that about 6 percent of these workers had suffered an injury from a needle.¹⁴ A larger percentage had been exposed to human blood.

The U.S. Agency for Toxic Substance and Disease Registry (ATSDR) of the U.S. Public Health Service and the U.S. EPA have reported to the U.S. Congress on the risks of injury from sharps, and the risks of contracting a viral infection from such injury.¹⁵ Table 2 presents these data for waste workers.

Table 2: Viral Hepatitis B Infections Caused by Occupational Injuries from Sharps

Category of worker	Annual Number of People Injured by Sharps (ATSDR)	Annual Number of HBV Infections Caused by Sharps (EPA)
Waste workers (outside hospitals)	500-7300 (mean = 3900)	1-15 (mean = 8)

As reported by the EPA and the ATSDR, the risk to contract a viral infection for waste workers who deal with hospital wastes *and* receive an injury from a sharp has a low probability. Not all waste workers receive cuts from sharps. Therefore, the actual risk for any worker, not just those who receive a cut, will be lower. This estimate includes all waste workers, and not just those at a wastewater treatment plant. It is likely that sanitation workers that first pick up solid wastes and then handle the sharps, etc., will be at greater risk than workers at a wastewater treatment plant. For WWTP workers, the risks from sharps will be even lesser. Considering that the Pilot Travel Center is not connected to a hospital or clinic and generates even lesser quantities of health-related wastes than the facilities considered by the EPA and the ATSDR, we believe the risks to the refinery's WWTP workers will be even lesser.

Although the probability that a sharp reaches the Gallup Refinery's WWTP and ultimately affects a worker is small, it is not negligible, and potentially with high consequences. Therefore, we address this possibility as a part of our biohazard controls plan, through training,

immunizations, appropriate personal protective equipment, and appropriate packaging, storage, transport, and disposal requirements (discussed in Chapter 3).

2.1.2 Risks to an Inadvertent Intruder

The refinery boundary is fenced, marked in key locations with warning signs, and its WWTP is staffed 24-hours. As we have seen in our evaluation of risks to workers, the maximum biohazards are present in the most active sections of the WWTP. It is these sections that are the most closely monitored. Therefore, we expect that an inadvertent intruder could spend undetected only a fraction of the time that a WWTP worker will be at the site, as the intrusion would be readily discovered by on-site workers. As the risks to a worker are small, the risks to an inadvertent intruder will be even smaller.

2.2 Exposure Risks to Off-site Residents

It is important to note that no groundwater contamination from the WWTP has ever left the refinery's boundary and an extensive series of monitoring wells exists around the WWTP and at the perimeter of the facility. Quarterly, bi-annual and annual monitoring occurs at and around the WWTP, and reports are regularly submitted to the OCD, as well as the New Mexico Environment Department. Therefore, we believe the only route for exposure of off-site residents is via the airborne release of bioaerosols.

In a detailed study¹⁶ of the effects of bioaerosols on residents near a large scale composting facility, doctors collected 356 questionnaires from nearby residents. Self-reported health complaints, doctors' diagnoses, and residential odor annoyance were assessed. Simultaneously, microbiological pollution was measured in residential outdoor air. The results established that concentrations of $> 10^5$ colony forming units of thermophilic actinomycetes, molds, and total bacteria/ m^3 were measured 200 m from the site, dropping to near background concentrations within 300 m. Reports of irritative airway complaints were associated with residency in the highest bioaerosol exposure, 150-200 m, dropping off > 400 -500 m from the site.

At the Gallup Refinery, the nearest permanent off-site residents are at a distance of approximately 3000 m. Transient population centers are somewhat closer, and at about 600 m. Therefore, no effects from any releases of bioaerosols can be expected. This conclusion is irrespective of wind direction, as studies have found that all effects drop off to background levels within 300 m. As the nearest off-site residents are a distance greater than ten times this level, we have confidence that no off-site effects from bioaerosols are probable.

2.3 Environmental Risks

The EPA has created regulations that govern the application of sewage sludge on land and that deal with the issue of the environmental effects of pathogens in sewage sludge. These regulations are in 40 CFR Part 503. In the case of the Gallup Refinery, all sludge is disposed off either at a landfill or (if containing hydrocarbons) sent for reprocessing at a refinery – this is in accordance with all applicable rules and regulations. None of our sludge is applied to land in a manner that makes it accessible to enter the open environment. Although not directly applicable to the case of

the Gallup Refinery, as we do not apply sewage sludge to land outside our boundary, the Part 503 regulations provide some guidance on the environmental risks posed by our WWTP and its associated evaporation ponds. Key provisions of the EPA's Part 503 regulations to minimize risks to the environment are to treat pathogens in sewage sludge by specified methods, and to treat the sewage in a manner that makes it unattractive to vectors (such as rodents, birds, etc.). Such vectors could spread the sludge further into the open environment.

To make sewage sludge less attractive to vectors, the EPA recommends that all volatile solids be reduced to less than 38% of the incoming stream. At the Gallup Refinery, to meet requirements of reducing benzene in our wastewater as well as treating other hydrocarbons and preventing oil from reaching our evaporation ponds, we aggressively treat our wastewater in two aeration lagoons using five aerators, and then subsequently treat the wastewater through a series of evaporation ponds. We aerate our lagoons vigorously with a residency time of approximately 2-4 days, and with an estimated 114 HP per Mgal of wastewater treated. We are confident that through this process we reduce our volatile solids by a factor far greater than 38%, which is the reduction factor recommended by the EPA.

After aeration, our biological treatment continues through a series of evaporation ponds, with no wastewater or sludge leaving our boundaries to enter the open environment. Another indication of how effectively the entire system treats the sewage component in our wastewater is the reduction in the levels of E. Coliform bacteria that we find in our evaporation ponds. Table 3 describes the levels of E. Coliform bacteria in our system ponds. There are a series of approximately 12 ponds, with some ponds in parallel. After treatment in six ponds, levels of E. Coliform bacteria fall from a starting level of >60,000 cfu/100 ml to below detection limits.

Table 3: Reductions in Levels of E. Coliform Bacteria in Our Ponds

Evaporation Pond 1	Evaporation Pond 3	Evaporation Pond 7
>60,000 cfu/100ml	> 6000 cfu/100 ml	Non-detect

Although it may be possible that some birds may find untreated water located in our aeration lagoons and early ponds of interest and could act as vectors of pathogens, we only notice birds attracted to the later ponds in our series. At these ponds, the levels of bacteria have fallen to extremely low levels as is evidenced by the low levels of E. Coliform bacteria that we have measured. There are daily, weekly, and monthly checks of our pond dikes, water levels, etc., by various personnel, and we have never noticed any large animal activity at our ponds. We believe this lack of activity shows the unattractiveness of any biosolids that may be present in our ponds. The environmental risks we believe are in conformity with the guidelines established by the EPA, which are developed for the entirely open application of sewage materials such as in forests and farm fields. Even though our materials are within our boundaries, we believe we still meet these requirements of the EPA for open environment application.

Chapter 3

3.0 Biohazard Management Plan

The New Mexico Solid Waste regulations require that, regardless of the quantity of infectious waste dealt with, all infectious waste treatment, storage and disposal facilities shall comply with the following operational requirement to create a management plan:

- “Every person who generates, transports, stores, treats, or disposes of infectious waste shall prepare and maintain on file a management plan for the waste that identifies the type of waste the person generates or handles, the segregation, packaging, labeling, collection, storage, and transportation procedures to be implemented, the treatment or disposal methods that will be used, the transporter and disposal facility that will be used, and the person responsible for the management of the infectious waste.”

The management plan we present in this document addresses all of these operational requirements.

We also present our engineering practices and controls, and our existing training, record-keeping, medical evaluations, immunizations, and personal protective equipment policies.

3.1 Infectious Wastes – Especially Sharps

Of particular concern at the Gallup Refinery’s WWTP is the possibility that health-care related wastes or infectious waste (such as sharps) may enter the WWTP through the Pilot Travel Center’s sanitary effluents. Of these infectious wastes, special care will need to be given to sharps that may have to be handled, segregated, packaged, labeled, and transported for proper disposal.

If any sharps are found by our WWTP Operators (or other personnel) we will ensure that –

- Sharps shall be contained for storage, transportation, treatment, and disposal in leak-proof, rigid, puncture-resistant containers which are manufactured for the purpose of sharps containment and are taped closed or tightly lidded to preclude loss of contents. (Figure 3 depicts a picture of such a container for sharps.) All bags used for containment purposes will be red or orange and clearly identified as specified in 29 CFR 1910.145(f) (4). Rigid containers will be conspicuously labeled as holding infectious waste. Disposable rigid containers will meet or exceed the standards for a classified strength of at least 200-pound mullen test. At any given time, we will ensure that we have available containers with our WWTP Operators.
- No other waste will be placed in the same container as regulated infectious waste
- Rigid infectious waste containers will not be reused
- Temporary storage and containment areas shall protect infectious waste from the elements, be ventilated to the outdoors, be only accessible to authorized persons, and be

marked with prominent warning signs on, or adjacent to, the exterior doors or gates. The warning signs shall be easily read during daylight from a distance of 25 feet.

- If a WWTP Operator discovers a sharp, he/she will place it (using gloves that can not be punctured) into the labeled container, for subsequent disposal.



Figure 3: Specialized container for temporary storage and disposal of sharps that constitute infectious waste/ biohazards

3.1.1 Disposal of Containers with Sharps

We do not anticipate a large volume of such sharps to be handled at the WWTP as the Pilot Travel Center is not connected to a hospital or clinic. Therefore, given that the quantity of sharps to be handled will be quite small, we will utilize Public Needle Collection Locations established within New Mexico by the Department of Health. The two locations nearest to us are at -

- Grants: Cibola PHO 515 W. High St. 285-4601
- Gallup: McKinley PHO 1919 College Dr. 722-4391

We may also utilize the services of an authorized infectious waste handler to dispose off such wastes properly.

3.2 Engineering and Work Practice Controls

Engineering and work practice controls shall be used to eliminate or minimize employee exposure. Where occupational exposure remains after institution of these controls, personal protective equipment shall also be used.

Engineering controls shall be examined and maintained or replaced on a regular schedule to ensure their effectiveness.

For our WWTP workers, we will provide an appropriate antiseptic hand cleanser in conjunction with clean cloth/paper towels or antiseptic towelettes. After antiseptic hand cleansers or towelettes are used, hands shall be washed with soap and running water as soon as feasible. We will also ensure that employees wash their hands immediately or as soon as feasible after removal of gloves or other personal protective equipment. We will ensure that employees wash hands and any other skin with soap and water, or flush mucous membranes with water immediately or as soon as feasible following contact of such body areas with blood or other potentially infectious materials.

Eating, drinking, smoking, applying cosmetics or lip balm, and handling contact lenses are prohibited in all work areas of the refinery where there is a reasonable likelihood of occupational exposure.

Food and drink shall not be kept in refrigerators, freezers, shelves, cabinets or on countertops or benchtops where blood or other potentially infectious materials are present.

3.3 Personal Protective Equipment

The Gallup Refinery provides, at no cost to the employee, appropriate personal protective equipment such as, but not limited to, gloves, coveralls, face shields or masks and eye protection, as well as personal respirators. Personal protective equipment does not permit blood or other potentially infectious materials to pass through to or reach the employee's work clothes, street clothes, undergarments, skin, eyes, mouth, or other mucous membranes under normal conditions of use and for the duration of time which the protective equipment is used.

Personal protective equipment in the appropriate sizes is readily accessible at the Gallup refinery and is issued to employees at the time of hire. Hypoallergenic gloves, glove liners, or other similar alternatives shall be made readily accessible to those employees who are allergic to the gloves normally provided.

3.3.1 Cleaning, Laundering, Disposal, Repair and Replacement

The Gallup Refinery regularly cleans, launders, and disposes of personal protective equipment required at no cost to the employee.

The Gallup Refinery repairs or replaces personal protective equipment as needed to maintain its effectiveness, at no cost to the employee.

If a garment(s) is penetrated by blood or other potentially infectious materials, the garment(s) shall be removed immediately or as soon as feasible.

If exposure has occurred, all personal protective equipment shall be removed prior to leaving the refinery. When personal protective equipment is removed it shall be placed in an appropriately designated area or container for storage, washing, decontamination or disposal.

Gloves are mandatory for all employees while working within the refinery. Specialized disposable gloves are also provided appropriate for the waste being handled. Disposable gloves are not washed or decontaminated for re-use. If infectious material is handled, the disposable gloves will also be disposed off as infectious waste and stored in a biohazard container pick-up - they will not be mixed with other types of wastes.

3.3.2 Eye Protection, and Face Shields

Eye protection devices, such as goggles or glasses with solid side shields, or chin-length face shields, are worn whenever splashes, spray, spatter, or droplets of any liquids can expose a worker. Thus, this protection will be available to our WWTP workers for dealing with infectious wastes and sharps.

3.4 Hepatitis B Vaccination and Post-exposure Evaluation and Follow-up

The Gallup refinery has an extensive medical evaluation program with record-keeping. We shall make available the Hepatitis B vaccine and vaccination series to all employees who have occupational exposure, and post-exposure evaluation and follow-up to all employees who have had an exposure incident.

We shall ensure that all medical evaluations and procedures including the hepatitis B vaccine and vaccination series and post-exposure evaluation and follow-up, including prophylaxis, are:

- Made available at no cost to the employee;
- Made available to the employee at a reasonable time and place;
- Performed by or under the supervision of a licensed physician or by or under the supervision of another licensed healthcare professional; and
- Provided according to recommendations of the U.S. Public Health Service current at the time these evaluations and procedures take place,
- We shall ensure that all laboratory tests are conducted by an accredited laboratory at no cost to the employee.

3.4.1 Hepatitis B Vaccination

Hepatitis B vaccination shall be made available after the employee has received appropriate training and to all employees who have occupational exposure unless the employee has previously received the complete hepatitis B vaccination series or the vaccine is contraindicated for medical reasons.

We shall highly recommend workers receive Hepatitis B vaccination, recognizing that, by law, this must remain a voluntary program. If an employee initially declines hepatitis B vaccination but at a later date decides to accept the vaccination, we shall make available hepatitis B

vaccination at that time. If a routine booster dose(s) of hepatitis B vaccine is recommended by the U.S. Public Health Service at a future date, such booster dose(s) shall be made available

3.4.2 Post-exposure Evaluation and Follow-up

Following a report of an exposure incident, we shall make immediately available to the exposed employee a confidential medical evaluation and follow-up,

3.5 Information and Training

We will provide training on this biohazard plan to all affected employees, so they are fully aware of all requirements regarding infectious wastes and other biohazards.

The Gallup Refinery requires each employee with occupational exposure to take an on-line training course related to blood-borne pathogens. Such training is provided at no cost to the employee and during working hours. Annual training for all employees is provided within one year of their previous training. This training is provided on-line through Pure Safety (<http://www.puresafety.com>). The training course has a test at the end that each employee has to pass. Sample screens of this on-line training are provided in Appendix A.

3.6 Medical Records

The Gallup Refinery has established and maintains an accurate record for each employee with occupational exposure, in accordance with 29 CFR 1910.1020.

We ensure that employee medical records

- Kept confidential; and
- Not disclosed or reported without the employee's express written consent to any person within or outside the workplace except as required by this section or as may be required by law.
- The employer shall maintain the records required by paragraph (h) for at least the duration of employment plus 30 years in accordance with 29 CFR 1910.1020.

3.7 Training Records

Training records with the following information are maintained:

- The dates of the training sessions;
- The contents or a summary of the training sessions;
- The names and qualifications of persons who have developed the on-line training; and
- The names and job titles of all persons attending the training sessions.

Training records are maintained for a minimum of 3 years from the date on which the training occurred.

3.8 Sharps Injury Log

We shall establish and maintain a sharps injury log for the recording of injuries from contaminated sharps that puncture the skin. The information in the sharps injury log shall be recorded and maintained in such manner as to protect the confidentiality of the injured employee. The sharps injury log shall contain, at a minimum:

- The type and brand of device involved in the incident,
- The department or work area where the exposure incident occurred, and
- An explanation of how the incident occurred.

3.9 Conclusions and Persons Responsible

We have created a management plan with engineering practices and controls as well as physical protective equipment to manage and control likely biohazards at the Gallup Refinery. We have also instituted an immunization program for employees who work with wastewater, and coupled this with training, medical evaluations, and record-keeping.

We will continually update this plan as needed. The persons responsible for its implementation and for oversight are the following:

Refinery Manager

Mark Turri

Operations Manager – Off-sites (oversees the WWTP)

Joel Quinones

Health and Safety Manager

Frank Deller

Environmental Manager

Ed Riege

Training Coordinator – Off-sites

Kelly Sanchez

APPENDIX A

http://www.puresafety.com - AICC Content Player - Microsoft Internet Explorer

Drag and Drop PureSafety

Try to match the following symptoms or characteristics to their related infectious disease by clicking and dragging.

HBV	Infected people have no symptoms or flu-like symptoms (worldwide, over 20 million people have died over past 20 years with over 40 million current carriers)
HIV	About 30% of infected people have no signs or symptoms (and symptoms are more common in adults than children).
HCV	About 80% of infected people have no signs or symptoms (most infections are contracted through illegal drug injections).

Progress Meter

◀ Back Restart Pause Next ▶

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Done Internet

start Biohazard_Plan-ver_... PureSafety - Microsof... http://www.puresafe... 10:12 AM

http://www.puresafety.com - AICC Content Player - Microsoft Internet Explorer

The Cold, Hard Facts! PureSafety

- Hepatitis B and hepatitis C viruses
 - Estimated 1.25 million infected with HBV
 - Estimated 3.9 million people are infected with HCV
 - Many workers risk occupational infection
 - Estimated 18,000 health care workers occupationally infected with hepatitis viruses each year
 - Estimated 200 health care workers die each year



Progress Meter

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Done Internet

Star Biohazard_Plan-ver... PureSafety - Microsof... http://www.puresafe... 10:17 AM

http://www.puresafety.com - AICC Content Player - Microsoft Internet Explorer

What Is Viral Hepatitis? PureSafety

- Both hepatitis B and hepatitis C are strains of viral hepatitis
- There is no cure
- Symptoms include:
 - Flu-like symptoms
 - Jaundice
 - Weakness
 - Lack of appetite
 - Vomiting
 - Stomach pain
 - Diarrhea



Progress Meter

◀ Back Restart Pause Next ▶

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Done Internet

start Biohazard_Plan-ver... PureSafety - Microsof... http://www.puresafe... 10:19 AM

¹ This definition is provided in a training module on bio-safety developed by the CDC and available at - <http://www.cdc.gov/od/ohs/pdffiles/Module%20%20-%20Biosafety.pdf>

² This guidance is available on the web site of the NM Department of Health at - http://www.health.state.nm.us/ohem/regional%20training%20and%20education%20powerpoint%20presentation/packaging_labeling_ship_infectious_substances.pdf.pdf; accessed on 2/25/2009.

³ The New Mexico Solid Waste Regulations are available at - http://www.nmenv.state.nm.us/NMED_regs/swb/20nmac9_1.html

⁴ U.S. Environmental Protection Agency – web site of the Biohazard Assessment Research Branch available at <http://www.epa.gov/microbes/barb.htm>

⁵ U.S. Environmental Protection Agency, “Control of Pathogens and Vector Attraction in Sewage Sludge”, EPA/625/R-92/013, available at - <http://www.epa.gov/nrmrl/pubs/625r92013/625R92013.pdf>

⁶ Biological Safety Committee, Division of Research Safety, University of Illinois at Urbana-Champaign, <http://www.fs.uiuc.edu/CAM/CAM/v/v-b-8.1.html>

⁷ Garvey, D.J., Exposure to Biohazards, *Professional Safety*, August 2005, Vol. 50, No. 8

⁸ McCunney, R.J. “Health Effects of Work at Wastewater Treatment Plants: A Review of the Literature with Guidelines for Medical Surveillance.” *American Journal of Industrial Medicine*, 1986, Volume 9, pages 271-279

⁹ Khuder, S.A., et al. “Prevalence of Infectious Diseases and Associated Symptoms in Wastewater Treatment Workers.” *American Journal of Industrial Medicine*, 1998, Volume 33, pages 571-577

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¹¹ Prazmo, Z. et al, “Exposure to Bioaerosols in a Municipal Sewage Treatment Plant”, *Annals of Agricultural and Environmental Medicine*, 2003, Volume 10, pages 241–248

¹² Hall Environmental Analysis Laboratory, Analytical Results for Pilot Travel Center and Gallup Refinery Wastewater, analyzed on December 12, 2008, Order No. 0812253, transmitted on January 5, 2009.

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¹⁵ World Health Organization, “Health Impacts of Health-care Waste”, available at - <http://www.cepis.ops-oms.org/eswww/fulltext/residuos/safe/safe03.pdf>

¹⁶ Herr, C.E.W. et al, “Effects of Bioaerosol Polluted Outdoor Air on Airways of Residents: A Cross Sectional Study”, *Occupational and Environmental Medicine*, 2003, Volume 60, pages 336-342.

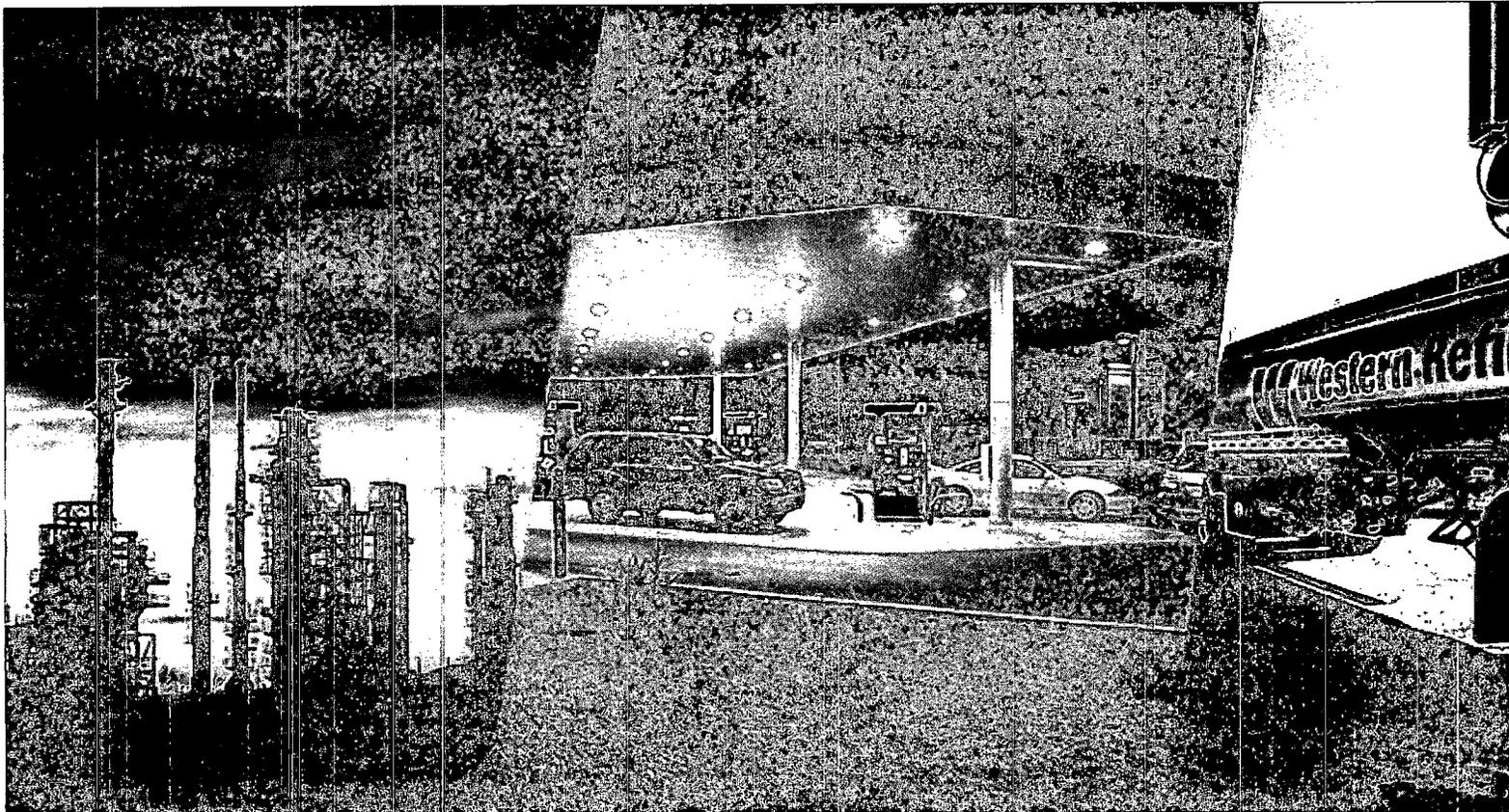
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Biohazard Management Plan
Wastewater Treatment Plant
Gallup Refinery

Western Refining
Gallup, New Mexico

March 2009

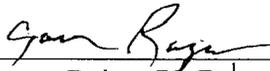


**Biohazard Management Plan
Wastewater Treatment Plant
Gallup Refinery**

**Western Refining
Gallup, New Mexico**

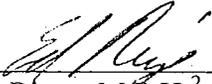
March 2009

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¹ Dr. Gaurav Rajen is an environmental engineer with several decades of experience who has conducted numerous assessments of risks from hazardous, radioactive, and biological wastes, worked closely with the U.S. Environmental Protection Agency and the Agency for Toxic Substance and Disease Registry on such assessments, and published extensively in these fields. He has supported Sandia National Laboratories' International Biological Threat Reduction Program and co-authored a report related to bio-security and bio-safety in South Asia. He was a speaker at the Biological Threat Reduction conference in 2005 sponsored by the State of New Mexico's Department of Homeland Security and Emergency Management.

² Mr. Ed Riege has several decades of experience in assessing environmental risks, including biological risks, and also hold a Master's degree in Public Health from Loma Linda University.

Abstract

We have created a Biohazard Management Plan that addresses possible risks from biohazards at the Gallup Refinery's Wastewater Treatment Plant (WWTP). We have assessed risks through literature reviews, independent analyses, and review of our monitoring data. To manage the most significant risks (in absolute terms the risks are low, but could have severe consequences), we have created a system of engineering practices and controls, physical protective equipment, and the use of specialized containers to temporarily store, and later transport and dispose any infectious wastes that could enter our WWTP. We find that environmental risks from the attraction of vectors (such as rodents or birds) to our biomaterials are minimized by virtue of the Aggressive Biological Treatment we utilize to treat our wastewater. Through our plan, we are in conformity with recommendations of the U.S. Environmental Protection Agency and the New Mexico Environment Department, as well as requirements related to blood-borne pathogens and other infectious materials required by the Occupational Safety and Health Administration.

Executive Summary

This "Biohazard Management Plan" addresses the potential biohazards present in the wastewater treatment plant (WWTP) of the Gallup Refinery of Western Refining. To develop this Biohazard Plan, we have first assessed risks from our WWTP's biohazards. Our major findings are -

- On-site risks from biohazards to workers at the refinery's WWTP in terms of health effects are a small but finite possibility – therefore, we have created a series of management controls to minimize these risks, including the use of appropriate physical protective equipment, an immunization program, and training. There are risks to WWTP workers from sharps (such as needles, etc.) contaminated with infectious wastes. As the consequences could be severe, we plan to keep on-site specially designed containers for infectious wastes and utilize existing programs of the State of New Mexico for disposal of sharps or other authorized infectious waste handlers. (Risks to any inadvertent intruder are estimated far lesser than the risks to on-site workers and risks to inadvertent intruders are found to not be of any appreciable concern.)
- Risks from airborne bioaerosols are shown to be the only route for risks from off-site exposures. Levels of bioaerosols from WWTPs are known to drop off to background after about 300 m. The nearest permanent residents are located 3000 m away. Other population centers are the Pilot Travel Center, and the Interstate-40 corridor which have workers and transient visitors. Both of these transient population centers are greater than 600 m away. As the distances to population centers are much greater than 300 m, we do not anticipate any risks from bioaerosols to these residents and transient visitors.
- Environmental risks are minimized by making our wastewater and sludge unattractive to vectors (such as rodents or birds).

Based on these assessments of risks and identification of risks that need to be minimized, we have created a detailed plan to manage risks and control exposures. Our plan conforms to the operational requirements mandated by the State of New Mexico's Solid Waste Regulations regarding infectious wastes that require the creation of a management plan for all WWTPs that might handle infectious wastes (regardless of quantity).

We have created a management plan with engineering practices and controls as well as physical protective equipment to manage and control likely biohazards at the Gallup Refinery. We offer an immunization program for employees who work with wastewater, and have coupled this with enhanced training, ongoing medical evaluations, and record-keeping. We will continually update this plan as needed. The persons responsible for the implementation and oversight of this plan are:

Refinery Manager

- Mark Turri

Operations Manager – Off-sites (oversees the WWTP)

- Joel Quinones

Health and Safety Manager

- Frank Deller

Environmental Manager

- Ed Riege

Training Coordinator – Off-sites

- Kelly Sanchez

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LIST OF ACRONYMS

ATSDR	Agency for Toxic Substances and Disease Registry
CDC	Centers for Disease Control
CFU	Colony forming units
EPA	Environmental Protection Agency
GPM	Gallons per minute
GPD	Gallons per day
HBV	Hepatitis B Virus
HIV	Human Immunodeficiency Virus
NMED	New Mexico Environment Department
OCD	Oil Conservation Division
OSHA	Occupational Safety and Health Administration
PPE	Physical protective equipment
WWTP	Wastewater treatment plant

Chapter 1

1.0 Introduction

This “Biohazard Management Plan” (Biohazard Plan) is submitted pursuant to the requirements of the New Mexico Energy Minerals and Natural Resources Department’s Oil Conservation Division (OCD) Groundwater Discharge Permit issued August 23, 2007 to the Gallup Refinery of Western Refining. The plan essentially addresses the potential biohazards present in the wastewater treatment plant (WWTP) of the Gallup Refinery.

In this plan, we begin by first assessing all of the potential biohazards posed by the industrial and sanitary wastewater treatment system of the Gallup Refinery. Through this assessment, we identify the major biohazards of concern. We then present a set of management actions that will be used to control these biohazards.

The biohazards at the wastewater treatment system arise from the wastewater generated from the refinery’s operations and also from the fact that the wastewater treatment system accepts sanitary effluents from the Pilot Travel Center. The Pilot Travel Center is a truck stop, with a convenience store and restaurants, located adjacent to the Gallup Refinery. Figure 1 depicts a satellite image of the general location of the Gallup Refinery and the Pilot Travel Center.

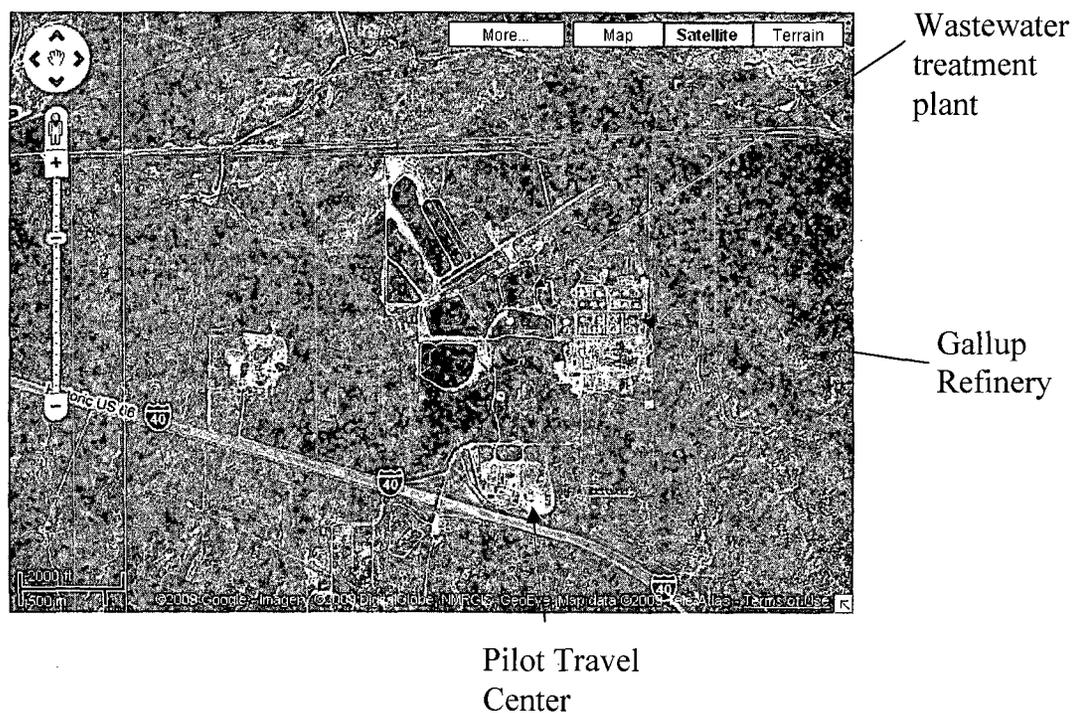


Figure 1: General locations of the Gallup Refinery and the Pilot Travel Center (both are located adjacent to Interstate-40, about 17 miles east of Gallup)

1.1 What is a Biohazard?

Generally, the term “biohazard” refers to blood-borne pathogens, as well as other materials that have the potential to cause infections such as bodily fluids, human and animal tissues, etc. Biohazards also include “sharps”, which could be in the form of used/unused needles, scalpels, broken glass, etc., that have been exposed to pathogens and that can cause cuts to handlers of such sharps. Health-related wastes that have been exposed to any such materials are also termed biohazards.

The term biohazard has several explicit definitions developed by various government agencies, differing in part on the specific interests of the agency.

The Occupational Safety and Health Administration (OSHA) of the U.S. Department of Labor defines (in 29 CFR 1910.145 (f) (2)) a "Biological hazard" or "BIOHAZARD" as “those infectious agents presenting a risk of death, injury or illness to employees”.

OSHA has also created regulations that specifically govern bloodborne pathogens and other potentially infectious materials in 29 CFR 1910.1030. These regulations define the following –

- **“Bloodborne Pathogens** means pathogenic microorganisms that are present in human blood and can cause disease in humans. These pathogens include, but are not limited to, hepatitis B virus (HBV) and human immunodeficiency virus (HIV).
- **Other Potentially Infectious Materials** means (1) The following human body fluids: semen, vaginal secretions, cerebrospinal fluid, synovial fluid, pleural fluid, pericardial fluid, peritoneal fluid, amniotic fluid, saliva in dental procedures, any body fluid that is visibly contaminated with blood, and all body fluids in situations where it is difficult or impossible to differentiate between body fluids; (2) Any unfixed tissue or organ (other than intact skin) from a human (living or dead); and (3) HIV-containing cell or tissue cultures, organ cultures, and HIV- or HBV-containing culture medium or other solutions; and blood, organs, or other tissues from experimental animals infected with HIV or HBV.”

These OSHA regulations require all employers whose employees might suffer (regardless of Personal Protective Equipment) exposure to bloodborne pathogens or other potentially infectious materials to carry out an exposure determination and create an exposure control plan. The current Health and Safety Plan of the Gallup Refinery and the Policies and Procedures for Personal Protective Equipment required of all employees meet the requirements of the OSHA regulations related to bloodborne pathogens and other potentially infectious materials. This Biohazard Plan augments these existing documents by creating additional controls for all potential biohazards that our WWTP workers may get exposed to.

The Centers for Disease Control (CDC) defines a biohazard as –

“An agent of biological origin that has the capacity to produce deleterious effects on humans, i.e. microorganisms, toxins and allergens derived from those organisms; and allergens and toxins derived from higher plants and animals.”¹

A search of the web site of the State of New Mexico’s Department of Health, Bureau of Health Emergency Management, and a review of various documents developed by this organization establishes that the State of New Mexico interprets the term biohazard in the sense that OSHA and the CDC define this term. For example, in guidance developed by the New Mexico Department of Health on packaging, labeling and shipping of infectious substances, the section on labeling requires a “biohazard” label to be affixed for US Postal Service shipments of infectious substances.² This label (shown in Figure 2) is what is used for biohazards as defined by OSHA and the CDC



Figure 2: Commonly used labels for “biohazards”

The New Mexico Environment Department (NMED) also equates infectious waste with biohazards. In its Solid Waste regulations, for example, the NMED states that -
“Vehicles transporting *infectious* waste shall be identified on each side of the vehicle with the name or trademark of the commercial hauler, the environment department registration number, and a **biohazard** symbol (20.9.5 NMAC 76). (Emphasis added.)

Further, in regulations regarding Solid Waste³ the NMED defines infectious wastes as –

- "infectious waste" means a limited class of substances that carry a probable risk of transmitting disease to humans, including but not limited to:
 - microbiological laboratory wastes, including cultures and stocks of infectious agents from clinical research and industrial laboratories, and disposable culture dishes and devices used to transfer, inoculate and mix cultures;

- pathological wastes, including human or animal tissues, organs and body parts, removed during surgery, autopsy or biopsy;
- disposable equipment, instruments, utensils, and other disposable materials which require special precautions because of contamination by highly contagious diseases;
- human blood and blood products, including waste blood, blood serum, and plasma;
- used sharps, including used hypodermic needles, syringes, scalpel blades, Pasteur pipettes and broken glass; and
- contaminated animal carcasses, body parts and bedding, especially those intentionally exposed to pathogens in research, in the production of biologicals or the "in vivo" testing of pharmaceuticals;"

The NMED regulations regarding infectious waste apply, without regard to the quantity of infectious waste produced, to all infectious waste storage, treatment, and disposal facilities.

The U.S. Environmental Protection Agency (EPA) has a broader definition of biohazards than OSHA, the CDC, and that adopted by the NMED. The EPA includes environmental risks in its assessment of biohazards. The EPA has created the Biohazard Assessment Research Branch (BARB) of the Microbiological & Chemical Exposure Assessment Research Division, National Exposure Research Laboratory that operates within the Office of Research and Development. "The Branch conceives, plans organizes, and conducts research that is designed to identify measure and characterize microbial pathogens that are transmitted through water, soil, and air.... The primary emphasis within this mission is the development and evaluation of practical and economical technology that will permit rapid, sensitive, and specific biohazard assessment of the environment with emphasis on risk to human health. Determining the occurrence, distribution, transport, and fate of human pathogenic microbes through the implementation and propagation of analytical procedures permits the Branch to establish data bases that can link environmental exposure of populations to microbial diseases."⁴

Along with the direct risks to human health from exposure, the EPA is concerned with risks from vectors (such as rodents) that could be attracted to a wastewater treatment system's sludge and other biomaterials.⁵ Such vectors could subsequently spread any potential biohazards present in the biomaterials emanating from the WWTP. The EPA is also concerned with the risks posed by the cross-species transfer of human pathogens and thus impacts to animal species other than human.

Most facilities that routinely generate and handle biohazards develop their own definitions of the term biohazard (usually combining the OSHA/CDC and the EPA approaches). For example, the University of Illinois at Urbana-Champaign defines the term biohazard to include "agents presenting a risk or potential risk to the well-being of man or animals, either directly through

infection or indirectly through disruption of the environment.”⁶ We adopt this definition in our Biohazard Plan, and consider both infectious and environmental risks in assessing risks from biohazards.

1.2 Brief Description of the Gallup Refinery’s Wastewater Treatment Plant and Associated Biohazards

The Gallup Refinery is a crude oil refinery with an approximate refining capacity of 23,000 barrels per day. Various process units are operated at the facility, including crude distillation, reforming, fluidized catalytic cracking, alkylation, isomerization, sulfur recovery, merox treater, and hydrotreating. Current and past operations have produced gasoline, diesel fuels, jet fuels, kerosene, propane, butane, and residual fuel.

The refinery generates approximately 100-200 gallons per minute (gpm) of industrial wastewater, or approximately 144,000 – 288,000 gallons per day (gpd). It is important to note that some streams of the refinery’s wastewater have often undergone a variety of industrial operations in process units that are hostile to biological growth, such as high temperatures, rapid changes in pH, etc. However, we do not discount the fact that biomaterials may be present in the industrial wastewater.

To the refinery’s industrial wastewater is added the sanitary effluent of the Pilot Travel Center which is at a flow rate of the order of 20-40 gpm, or 28,800 – 57,600 gpd. The Pilot Travel Center is not connected to a hospital or a clinic and so does not routinely generate hospital-related wastes and materials such as sharps. A new lift-station with a filter screen is being constructed to bring this sanitary effluent to the Gallup Refinery’s WWTP. The filter screen has an automated system for removing sludge particles that are cleaned off through a rotary system and placed into a bag and drum for subsequent disposal. As this location has the highest probability of having sharps present, special care will be taken to train our WWTP workers in the handling of such sharps and in providing them adequate protection. (This issue is discussed in more detail in Chapter 3.)

The combined streams of the industrial wastewater and the Pilot Travel Center’s sanitary effluents are treated in a series of two aeration lagoons where they undergo Aggressive Biological Treatment through the action of five aerators that operate continuously. The treated wastewater then enters a series of evaporation ponds. Wastewater from a Reverse Osmosis unit at a flow rate of approximately 60 gpm enters into the second pond. This wastewater from the Reverse Osmosis unit does not contain sanitary effluents, further diluting the sanitary effluents that have come from the Pilot Travel center into the WWTP.

Raw sewage and WWTPs can contain a variety of disease organisms including bacteria, viruses, fungus, worms and protozoa. Table 1 lists some of the organisms that may be found in wastewater containing raw sewage and the symptoms caused by exposure to these organisms.⁷ This is an illustrative list – it is not a complete list of all pathogenic organisms that might be contained in sewage. Although only about sixteen percent of the Gallup Refinery’s wastewater stream contains sanitary effluents, organisms present in raw sewage are likely present in the Gallup Refinery’s WWTP.

Table 1: Organisms that May Be Found in WWTPs or Sewage (illustrative list – not complete)

Organism	Signs & Symptoms	Average Latency Period
<i>Bacteria</i>		
Salmonella	Nausea, headache, diarrhea and vomiting; almost always with a fever.	6 to 72 hours
Tetanus (lockjaw)	Muscular stiffness in jaw, neck. Sweating, fever, difficulty swallowing.	8 days
Shigella	Cramps, diarrhea, fever, bloody stool, nausea, vomiting.	1 to 3 days
Leptospirosis (Weil's Disease)	Intestinal problems, liver and kidney disease, jaundice.	4 to 10 days
E. coli	Diarrhea, vomiting, little or no fever, blood often seen in stool.	Approximately 3 days
<i>Viruses</i>		
Hepatitis A	Fever, abdominal pain, nausea, jaundice, dark-colored urine.	Approximately 30 days
Hepatitis B	Nausea, vomiting, loss of appetite, jaundice, joint pain.	60 to 90 days
Hepatitis C	Develops slowly, loss of appetite, stomach pain, nausea and vomiting. Jaundice is less common.	6 to 9 weeks
HIV	Destroys immune system, prone to opportunistic infections.	1 to 2 years
<i>Parasites</i>		
Entamoeba histolytica (amebiasis)	Mild nausea, loose stool, abdominal tenderness. In severe cases can spread throughout the body and attack other organs, especially the liver.	14 to 28 days
Giardia lamblia	Cramps, weight loss, loose/greasy stool, bloating. Fever is rare.	

The major routes of exposure to such organisms are –

- Oral, primarily from hand-to-mouth contact
- Skin absorption (unlikely unless the skin has been damaged by cuts, etc.)
- Inhalation of bioaerosols (i.e. aerosols containing microorganisms)
- Mucous membranes (such as in the eyes or nose)
- Parenteral, that is piercing of the skin or mucous membranes by sharps, etc.

1.3 Scope of this Biohazard Plan

In this Biohazard Plan, to assess risks from the WWTP's biohazards our approach is as follows:

- We assess on-site risks from biohazards to workers at the refinery's WWTP, as well as to an inadvertent intruder
- We assess off-site risks to nearby residents
- We assess environmental risks

Based on these assessments we then present a detailed plan to manage these risks and control exposures.

Our plan conforms to the operational requirements mandated by the State of New Mexico's Solid Waste Regulations regarding infectious wastes that require the creation of a management plan for all WWTPs that might handle infectious wastes (regardless of quantity).

Chapter 2

2.0 Assessment of Biohazards

2.1 On-site Exposures - Workers and an Inadvertent Intruder

Numerous detailed studies have considered the risks from biohazards to WWTP workers and have not found higher infection rates for sewage workers compared to similar populations of workers not exposed to sewage. Our WWTP workers will be dealing with lesser and more dilute quantities of sewage than those in large municipal WWTPs. Therefore, we expect that the health effects of dealing with sewage will be even lesser for the WWTP workers of the Gallup Refinery.

A detailed review of a large number of health studies of WWTP workers is available in a paper by R.J. McCunney (published in the American Journal of Industrial Medicine) that surveys the literature on health effects of working at sewage plants and provides guidelines for medical surveillance.⁸ One of the studies described in this paper over one year found no difference in the rates of parasitic organism infections between 125 sewage workers and 125 highway workers. Another study involving 150 wastewater treatment workers found no cases of polio, salmonellosis, leptospirosis, shigellosis, typhoid fever, hepatitis A, giardiasis or amoebiasis.⁹

Although the above-referenced studies have considered health risks to workers at WWTPs, other studies have measured the air concentrations of bioaerosols at WWTPs and compared these with standards for occupational exposures. At WWTPs, the air concentrations of bioaerosols are generally highest at locations such as incoming wastewater inlets, aeration lagoons, and sludge treatment areas.¹⁰ At a city of 160,000 people in Poland, samples were collected at nine critical locations within the sewage plant and three at different locations in the city.¹¹ At this sewage treatment plant, the study found the concentrations of total mesophilic bacteria (both Gram-positive and Gram-negative) were within a range of $2.4-70.7 \times 10^2$ colony forming units (cfu)/m³. Altogether, 20 potentially pathogenic species or genera of bacteria and fungi were identified in the air samples taken in the examined plant. The values of the respirable fraction of airborne microflora varied within a fairly wide range and were between 24.1-100%. The concentrations of airborne endotoxin were in the range of 0.104-5.2 ng/m³. The conclusions of this study, which are representative of those determined by other similar studies, are that the concentrations of microorganisms and endotoxin in the examined municipal sewage treatment plant were low and did not exceed occupational exposure limit values. No treatment units were within enclosed spaces at this WWTP. The refinery's WWTP also does not have any enclosed areas in which treatment units are located. We believe the conclusions of this study are applicable to the Gallup Refinery's WWTP.

It should be noted that the Pilot Travel Center's sanitary effluents are not as concentrated in biosolids as is generally the case for WWTPs that handle municipal wastewater. For example, we have found that the levels of Volatile Suspended Solids in the Pilot Travel Center's effluent are of the order of 75 ppm¹²; as compared to levels generally accepted to be typical of domestic sewage which are of the order of 240 ppm.¹³ Therefore, our WWTP workers will be at less risk

than workers in a municipal WWTP - the Pilot Travel Center effluent is less concentrated to begin with and further diluted by non-sewage containing wastewater.

2.1.1 Assessment of Risks to Workers from Hazardous Health-care Waste

The Pilot Travel Center does not have a connection to a health facility or a clinic. However, there is a possibility of customers disposing off hazardous health-related wastes (as well as other wastes of a similar nature, such as needles contaminated with human blood from intravenous drug users). Therefore, we evaluate in this section the risks that could result from exposure to such wastes at the Gallup Refinery's WWTP.

In a survey of occupational exposure of waste industry workers in Washington State, W.L. Turnberg and F. Frost found that about 6 percent of these workers had suffered an injury from a needle.¹⁴ A larger percentage had been exposed to human blood.

The U.S. Agency for Toxic Substance and Disease Registry (ATSDR) of the U.S. Public Health Service and the U.S. EPA have reported to the U.S. Congress on the risks of injury from sharps, and the risks of contracting a viral infection from such injury.¹⁵ Table 2 presents these data for waste workers.

Table 2: Viral Hepatitis B Infections Caused by Occupational Injuries from Sharps

Category of worker	Annual Number of People Injured by Sharps (ATSDR)	Annual Number of HBV Infections Caused by Sharps (EPA)
Waste workers (outside hospitals)	500-7300 (mean = 3900)	1-15 (mean = 8)

As reported by the EPA and the ATSDR, the risk to contract a viral infection for waste workers who deal with hospital wastes *and* receive an injury from a sharp has a low probability. Not all waste workers receive cuts from sharps. Therefore, the actual risk for any worker, not just those who receive a cut, will be lower. This estimate includes all waste workers, and not just those at a wastewater treatment plant. It is likely that sanitation workers that first pick up solid wastes and then handle the sharps, etc., will be at greater risk than workers at a wastewater treatment plant. For WWTP workers, the risks from sharps will be even lesser. Considering that the Pilot Travel Center is not connected to a hospital or clinic and generates even lesser quantities of health-related wastes than the facilities considered by the EPA and the ATSDR, we believe the risks to the refinery's WWTP workers will be even lesser.

Although the probability that a sharp reaches the Gallup Refinery's WWTP and ultimately affects a worker is small, it is not negligible, and potentially with high consequences. Therefore, we address this possibility as a part of our biohazard controls plan, through training,

immunizations, appropriate personal protective equipment, and appropriate packaging, storage, transport, and disposal requirements (discussed in Chapter 3).

2.1.2 Risks to an Inadvertent Intruder

The refinery boundary is fenced, marked in key locations with warning signs, and its WWTP is staffed 24-hours. As we have seen in our evaluation of risks to workers, the maximum biohazards are present in the most active sections of the WWTP. It is these sections that are the most closely monitored. Therefore, we expect that an inadvertent intruder could spend undetected only a fraction of the time that a WWTP worker will be at the site, as the intrusion would be readily discovered by on-site workers. As the risks to a worker are small, the risks to an inadvertent intruder will be even smaller.

2.2 Exposure Risks to Off-site Residents

It is important to note that no groundwater contamination from the WWTP has ever left the refinery's boundary and an extensive series of monitoring wells exists around the WWTP and at the perimeter of the facility. Quarterly, bi-annual and annual monitoring occurs at and around the WWTP, and reports are regularly submitted to the OCD, as well as the New Mexico Environment Department. Therefore, we believe the only route for exposure of off-site residents is via the airborne release of bioaerosols.

In a detailed study¹⁶ of the effects of bioaerosols on residents near a large scale composting facility, doctors collected 356 questionnaires from nearby residents. Self-reported health complaints, doctors' diagnoses, and residential odor annoyance were assessed. Simultaneously, microbiological pollution was measured in residential outdoor air. The results established that concentrations of $> 10^5$ colony forming units of thermophilic actinomycetes, molds, and total bacteria/ m^3 were measured 200 m from the site, dropping to near background concentrations within 300 m. Reports of irritative airway complaints were associated with residency in the highest bioaerosol exposure, 150-200 m, dropping off > 400 -500 m from the site.

At the Gallup Refinery, the nearest permanent off-site residents are at a distance of approximately 3000 m. Transient population centers are somewhat closer, and at about 600 m. Therefore, no effects from any releases of bioaerosols can be expected. This conclusion is irrespective of wind direction, as studies have found that all effects drop off to background levels within 300 m. As the nearest off-site residents are a distance greater than ten times this level, we have confidence that no off-site effects from bioaerosols are probable.

2.3 Environmental Risks

The EPA has created regulations that govern the application of sewage sludge on land and that deal with the issue of the environmental effects of pathogens in sewage sludge. These regulations are in 40 CFR Part 503. In the case of the Gallup Refinery, all sludge is disposed off either at a landfill or (if containing hydrocarbons) sent for reprocessing at a refinery – this is in accordance with all applicable rules and regulations. None of our sludge is applied to land in a manner that makes it accessible to enter the open environment. Although not directly applicable to the case of

the Gallup Refinery, as we do not apply sewage sludge to land outside our boundary, the Part 503 regulations provide some guidance on the environmental risks posed by our WWTP and its associated evaporation ponds. Key provisions of the EPA's Part 503 regulations to minimize risks to the environment are to treat pathogens in sewage sludge by specified methods, and to treat the sewage in a manner that makes it unattractive to vectors (such as rodents, birds, etc.). Such vectors could spread the sludge further into the open environment.

To make sewage sludge less attractive to vectors, the EPA recommends that all volatile solids be reduced to less than 38% of the incoming stream. At the Gallup Refinery, to meet requirements of reducing benzene in our wastewater as well as treating other hydrocarbons and preventing oil from reaching our evaporation ponds, we aggressively treat our wastewater in two aeration lagoons using five aerators, and then subsequently treat the wastewater through a series of evaporation ponds. We aerate our lagoons vigorously with a residency time of approximately 2-4 days, and with an estimated 114 HP per Mgal of wastewater treated. We are confident that through this process we reduce our volatile solids by a factor far greater than 38%, which is the reduction factor recommended by the EPA.

After aeration, our biological treatment continues through a series of evaporation ponds, with no wastewater or sludge leaving our boundaries to enter the open environment. Another indication of how effectively the entire system treats the sewage component in our wastewater is the reduction in the levels of E. Coliform bacteria that we find in our evaporation ponds. Table 3 describes the levels of E. Coliform bacteria in our system ponds. There are a series of approximately 12 ponds, with some ponds in parallel. After treatment in six ponds, levels of E. Coliform bacteria fall from a starting level of >60,000 cfu/100 ml to below detection limits.

Table 3: Reductions in Levels of E. Coliform Bacteria in Our Ponds

Evaporation Pond 1	Evaporation Pond 3	Evaporation Pond 7
>60,000 cfu/100ml	> 6000 cfu/100 ml	Non-detect

Although it may be possible that some birds may find untreated water located in our aeration lagoons and early ponds of interest and could act as vectors of pathogens, we only notice birds attracted to the later ponds in our series. At these ponds, the levels of bacteria have fallen to extremely low levels as is evidenced by the low levels of E. Coliform bacteria that we have measured. There are daily, weekly, and monthly checks of our pond dikes, water levels, etc., by various personnel, and we have never noticed any large animal activity at our ponds. We believe this lack of activity shows the unattractiveness of any biosolids that may be present in our ponds. The environmental risks we believe are in conformity with the guidelines established by the EPA, which are developed for the entirely open application of sewage materials such as in forests and farm fields. Even though our materials are within our boundaries, we believe we still meet these requirements of the EPA for open environment application.

Chapter 3

3.0 Biohazard Management Plan

The New Mexico Solid Waste regulations require that, regardless of the quantity of infectious waste dealt with, all infectious waste treatment, storage and disposal facilities shall comply with the following operational requirement to create a management plan:

- “Every person who generates, transports, stores, treats, or disposes of infectious waste shall prepare and maintain on file a management plan for the waste that identifies the type of waste the person generates or handles, the segregation, packaging, labeling, collection, storage, and transportation procedures to be implemented, the treatment or disposal methods that will be used, the transporter and disposal facility that will be used, and the person responsible for the management of the infectious waste.”

The management plan we present in this document addresses all of these operational requirements.

We also present our engineering practices and controls, and our existing training, record-keeping, medical evaluations, immunizations, and personal protective equipment policies.

3.1 Infectious Wastes – Especially Sharps

Of particular concern at the Gallup Refinery’s WWTP is the possibility that health-care related wastes or infectious waste (such as sharps) may enter the WWTP through the Pilot Travel Center’s sanitary effluents. Of these infectious wastes, special care will need to be given to sharps that may have to be handled, segregated, packaged, labeled, and transported for proper disposal.

If any sharps are found by our WWTP Operators (or other personnel) we will ensure that –

- Sharps shall be contained for storage, transportation, treatment, and disposal in leak-proof, rigid, puncture-resistant containers which are manufactured for the purpose of sharps containment and are taped closed or tightly lidded to preclude loss of contents. (Figure 3 depicts a picture of such a container for sharps.) All bags used for containment purposes will be red or orange and clearly identified as specified in 29 CFR 1910.145(f) (4). Rigid containers will be conspicuously labeled as holding infectious waste. Disposable rigid containers will meet or exceed the standards for a classified strength of at least 200-pound mullen test. At any given time, we will ensure that we have available containers with our WWTP Operators.
- No other waste will be placed in the same container as regulated infectious waste
- Rigid infectious waste containers will not be reused
- Temporary storage and containment areas shall protect infectious waste from the elements, be ventilated to the outdoors, be only accessible to authorized persons, and be

marked with prominent warning signs on, or adjacent to, the exterior doors or gates. The warning signs shall be easily read during daylight from a distance of 25 feet.

- If a WWTP Operator discovers a sharp, he/she will place it (using gloves that can not be punctured) into the labeled container, for subsequent disposal.



Figure 3: Specialized container for temporary storage and disposal of sharps that constitute infectious waste/ biohazards

3.1.1 Disposal of Containers with Sharps

We do not anticipate a large volume of such sharps to be handled at the WWTP as the Pilot Travel Center is not connected to a hospital or clinic. Therefore, given that the quantity of sharps to be handled will be quite small, we will utilize Public Needle Collection Locations established within New Mexico by the Department of Health. The two locations nearest to us are at -

- Grants: Cibola PHO 515 W. High St. 285-4601
- Gallup: McKinley PHO 1919 College Dr. 722-4391

We may also utilize the services of an authorized infectious waste handler to dispose off such wastes properly.

3.2 Engineering and Work Practice Controls

Engineering and work practice controls shall be used to eliminate or minimize employee exposure. Where occupational exposure remains after institution of these controls, personal protective equipment shall also be used.

Engineering controls shall be examined and maintained or replaced on a regular schedule to ensure their effectiveness.

For our WWTP workers, we will provide an appropriate antiseptic hand cleanser in conjunction with clean cloth/paper towels or antiseptic towelettes. After antiseptic hand cleansers or towelettes are used, hands shall be washed with soap and running water as soon as feasible. We will also ensure that employees wash their hands immediately or as soon as feasible after removal of gloves or other personal protective equipment. We will ensure that employees wash hands and any other skin with soap and water, or flush mucous membranes with water immediately or as soon as feasible following contact of such body areas with blood or other potentially infectious materials.

Eating, drinking, smoking, applying cosmetics or lip balm, and handling contact lenses are prohibited in all work areas of the refinery where there is a reasonable likelihood of occupational exposure.

Food and drink shall not be kept in refrigerators, freezers, shelves, cabinets or on countertops or benchtops where blood or other potentially infectious materials are present.

3.3 Personal Protective Equipment

The Gallup Refinery provides, at no cost to the employee, appropriate personal protective equipment such as, but not limited to, gloves, coveralls, face shields or masks and eye protection, as well as personal respirators. Personal protective equipment does not permit blood or other potentially infectious materials to pass through to or reach the employee's work clothes, street clothes, undergarments, skin, eyes, mouth, or other mucous membranes under normal conditions of use and for the duration of time which the protective equipment is used.

Personal protective equipment in the appropriate sizes is readily accessible at the Gallup refinery and is issued to employees at the time of hire. Hypoallergenic gloves, glove liners, or other similar alternatives shall be made readily accessible to those employees who are allergic to the gloves normally provided.

3.3.1 Cleaning, Laundering, Disposal, Repair and Replacement

The Gallup Refinery regularly cleans, launders, and disposes of personal protective equipment required at no cost to the employee.

The Gallup Refinery repairs or replaces personal protective equipment as needed to maintain its effectiveness, at no cost to the employee.

If a garment(s) is penetrated by blood or other potentially infectious materials, the garment(s) shall be removed immediately or as soon as feasible.

If exposure has occurred, all personal protective equipment shall be removed prior to leaving the refinery. When personal protective equipment is removed it shall be placed in an appropriately designated area or container for storage, washing, decontamination or disposal.

Gloves are mandatory for all employees while working within the refinery. Specialized disposable gloves are also provided appropriate for the waste being handled. Disposable gloves are not washed or decontaminated for re-use. If infectious material is handled, the disposable gloves will also be disposed off as infectious waste and stored in a biohazard container pick-up - they will not be mixed with other types of wastes.

3.3.2 Eye Protection, and Face Shields

Eye protection devices, such as goggles or glasses with solid side shields, or chin-length face shields, are worn whenever splashes, spray, spatter, or droplets of any liquids can expose a worker. Thus, this protection will be available to our WWTP workers for dealing with infectious wastes and sharps.

3.4 Hepatitis B Vaccination and Post-exposure Evaluation and Follow-up

The Gallup refinery has an extensive medical evaluation program with record-keeping. We shall make available the Hepatitis B vaccine and vaccination series to all employees who have occupational exposure, and post-exposure evaluation and follow-up to all employees who have had an exposure incident.

We shall ensure that all medical evaluations and procedures including the hepatitis B vaccine and vaccination series and post-exposure evaluation and follow-up, including prophylaxis, are:

- Made available at no cost to the employee;
- Made available to the employee at a reasonable time and place;
- Performed by or under the supervision of a licensed physician or by or under the supervision of another licensed healthcare professional; and
- Provided according to recommendations of the U.S. Public Health Service current at the time these evaluations and procedures take place,
- We shall ensure that all laboratory tests are conducted by an accredited laboratory at no cost to the employee.

3.4.1 Hepatitis B Vaccination

Hepatitis B vaccination shall be made available after the employee has received appropriate training and to all employees who have occupational exposure unless the employee has previously received the complete hepatitis B vaccination series or the vaccine is contraindicated for medical reasons.

We shall highly recommend workers receive Hepatitis B vaccination, recognizing that, by law, this must remain a voluntary program. If an employee initially declines hepatitis B vaccination but at a later date decides to accept the vaccination, we shall make available hepatitis B

vaccination at that time. If a routine booster dose(s) of hepatitis B vaccine is recommended by the U.S. Public Health Service at a future date, such booster dose(s) shall be made available

3.4.2 Post-exposure Evaluation and Follow-up

Following a report of an exposure incident, we shall make immediately available to the exposed employee a confidential medical evaluation and follow-up,

3.5 Information and Training

We will provide training on this biohazard plan to all affected employees, so they are fully aware of all requirements regarding infectious wastes and other biohazards.

The Gallup Refinery requires each employee with occupational exposure to take an on-line training course related to blood-borne pathogens. Such training is provided at no cost to the employee and during working hours. Annual training for all employees is provided within one year of their previous training. This training is provided on-line through Pure Safety (<http://www.puresafety.com>). The training course has a test at the end that each employee has to pass. Sample screens of this on-line training are provided in Appendix A.

3.6 Medical Records

The Gallup Refinery has established and maintains an accurate record for each employee with occupational exposure, in accordance with 29 CFR 1910.1020.

We ensure that employee medical records

- Kept confidential; and
- Not disclosed or reported without the employee's express written consent to any person within or outside the workplace except as required by this section or as may be required by law.
- The employer shall maintain the records required by paragraph (h) for at least the duration of employment plus 30 years in accordance with 29 CFR 1910.1020.

3.7 Training Records

Training records with the following information are maintained:

- The dates of the training sessions;
- The contents or a summary of the training sessions;
- The names and qualifications of persons who have developed the on-line training; and
- The names and job titles of all persons attending the training sessions.

Training records are maintained for a minimum of 3 years from the date on which the training occurred.

3.8 Sharps Injury Log

We shall establish and maintain a sharps injury log for the recording of injuries from contaminated sharps that puncture the skin. The information in the sharps injury log shall be recorded and maintained in such manner as to protect the confidentiality of the injured employee. The sharps injury log shall contain, at a minimum:

- The type and brand of device involved in the incident,
- The department or work area where the exposure incident occurred, and
- An explanation of how the incident occurred.

3.9 Conclusions and Persons Responsible

We have created a management plan with engineering practices and controls as well as physical protective equipment to manage and control likely biohazards at the Gallup Refinery. We have also instituted an immunization program for employees who work with wastewater, and coupled this with training, medical evaluations, and record-keeping.

We will continually update this plan as needed. The persons responsible for its implementation and for oversight are the following:

Refinery Manager
Mark Turri

Operations Manager – Off-sites (oversees the WWTP)
Joel Quinones

Health and Safety Manager
Frank Deller

Environmental Manager
Ed Riege

Training Coordinator – Off-sites
Kelly Sanchez

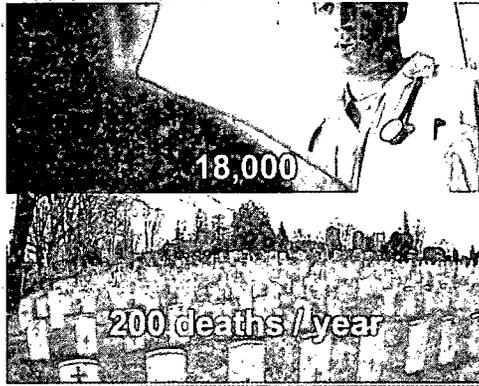
APPENDIX A

The screenshot shows a web browser window with the address bar displaying `http://www.puresafety.com`. The page title is "AICC Content Player - Microsoft Internet Explorer". The main content area is titled "Drag and Drop" and features the "PureSafety" logo. The instructions read: "Try to match the following symptoms or characteristics to their related infectious disease by clicking and dragging." There are three disease boxes on the left: "HBV", "HIV", and "HCV". On the right, there are three symptom boxes: "Infected people have no symptoms or flu-like symptoms (worldwide, over 20 million people have died over past 20 years with over 40 million current carriers)", "About 30% of infected people have no signs or symptoms (and symptoms are more common in adults than children).", and "About 80% of infected people have no signs or symptoms (most infections are contracted through illegal drug injections)". At the bottom of the game area, there is a "Progress Meter" and navigation buttons: "Back", "Restart", "Pause", and "Next". A copyright notice at the bottom of the page reads: "Copyright © 2009 PureWorks, Inc. and/or its respective licensors." The browser's status bar shows "Done" and "Internet". The taskbar at the bottom includes the Start button and several open applications: "Dohazard_Plan-ver...", "PureSafety - Microsof...", and "http://www.puresafe...". The system clock shows "10:12 AM".

The Cold, Hard Facts!

PureSafety

- Hepatitis B and hepatitis C viruses
 - Estimated 1.25 million infected with HBV
 - Estimated 3.9 million people are infected with HCV
 - Many workers risk occupational infection
 - Estimated 18,000 health care workers occupationally infected with hepatitis viruses each year
 - Estimated 200 health care workers die each year



Progress Meter

◀ Back

Restart

Pause

Next ▶

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Done

Internet

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Microsoft Internet Explorer

PureSafety - Microsoft

http://www.puresafe...

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http://www.puresafety.com - AICC Content Player - Microsoft Internet Explorer

What Is Viral Hepatitis? PureSafety

- Both hepatitis B and hepatitis C are strains of viral hepatitis
- There is no cure
- Symptoms include:
 - Flu-like symptoms
 - Jaundice
 - Weakness
 - Lack of appetite
 - Vomiting
 - Stomach pain
 - Diarrhea



Progress Meter

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Done Internet

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ADDENDUM

Western Refining Southwest (Gallup Refinery) is including and implementing the following statement as recommended by the New Mexico Department of Health (DOH): “Dr. Smelser recommended that any employee who would come into contact with sewage should also be offered the Hepatitis A vaccination. This is a 2-dose vaccination that provides a lifelong immunity. In addition, if a sharps injury occurs during work, Western Refining should contact Epidemiology and Response Division at (505) 827-0006. The call will be routed to Dr. Steve Jenison. In general, all employees should be encouraged to remain up to date on their vaccinations.”

¹ This definition is provided in a training module on bio-safety developed by the CDC and available at - <http://www.cdc.gov/od/ohs/pdffiles/Module%20%20-%20Biosafety.pdf>

² This guidance is available on the web site of the NM Department of Health at - http://www.health.state.nm.us/ohem/regional%20training%20and%20education%20powerpoint%20presentation/packaging_labeling_ship_infectious_substances.pdf.pdf; accessed on 2/25/2009.

³ The New Mexico Solid Waste Regulations are available at - http://www.nmenv.state.nm.us/NMED_regs/swb/20nmac9_1.html

⁴ U.S. Environmental Protection Agency – web site of the Biohazard Assessment Research Branch available at <http://www.epa.gov/microbes/barb.htm>

⁵ U.S. Environmental Protection Agency, “Control of Pathogens and Vector Attraction in Sewage Sludge”, EPA/625/R-92/013, available at - <http://www.epa.gov/nrmrl/pubs/625r92013/625R92013.pdf>

⁶ Biological Safety Committee, Division of Research Safety, University of Illinois at Urbana-Champaign, <http://www.fs.uiuc.edu/CAM/CAM/v/v-b-8.1.html>

⁷ Garvey, D.J., Exposure to Biohazards, *Professional Safety*, August 2005, Vol. 50, No. 8

⁸ McCunney, R.J. “Health Effects of Work at Wastewater Treatment Plants: A Review of the Literature with Guidelines for Medical Surveillance.” *American Journal of Industrial Medicine*, 1986, Volume 9, pages 271-279

⁹ Khuder, S.A., et al. “Prevalence of Infectious Diseases and Associated Symptoms in Wastewater Treatment Workers.” *American Journal of Industrial Medicine*, 1998, Volume 33, pages 571-577

¹⁰ Laitinen, S., et al. “Workers’ Exposure to Airborne Bacteria and Endotoxins at Industrial Wastewater Treatment Plants.” *AIHA Journal*, 1994, Volume 55 pages 1055-1059

¹¹ Prazmo, Z. et al, “Exposure to Bioaerosols in a Municipal Sewage Treatment Plant”, *Annals of Agricultural and Environmental Medicine*, 2003, Volume 10, pages 241–248

¹² Hall Environmental Analysis Laboratory, Analytical Results for Pilot Travel Center and Gallup Refinery Wastewater, analyzed on December 12, 2008, Order No. 0812253, transmitted on January 5, 2009.

¹³ R. Stuetz and F.B. Frechen, *Odors in Wastewater Treatment, Measurement, Modeling and Control*, International Water Association Publishing, London, 2001, page 276

¹⁴ W L Turnberg and F Frost, “Survey of Occupational Exposure of Waste Industry Workers to Infectious Waste in Washington State”, *American Journal of Public Health*, Vol. 80, Issue 10 1262-1264,

¹⁵ World Health Organization, “Health Impacts of Health-care Waste”, available at - <http://www.cepis.ops-oms.org/eswww/fulltext/residuos/safe/safe03.pdf>

¹⁶ Herr, C.E.W. et al, “Effects of Bioaerosol Polluted Outdoor Air on Airways of Residents: A Cross Sectional Study”, *Occupational and Environmental Medicine*, 2003, Volume 60, pages 336-342.

Chavez, Carl J, EMNRD

From: Chavez, Carl J, EMNRD
Sent: Tuesday, March 24, 2009 1:29 PM
To: 'Riege, Ed'
Cc: Jones, Brad A., EMNRD; Monzeglio, Hope, NMENV; 'Rajen, Gaurav'
Subject: FW: Western Refining SW- Gallup Refinery (GW-032) - Bio-Hazard Plan

Ed:

Please note the comments from DOH on the Bio-Hazard Plan provided below.

DOH Comments:

Dr. Smelser recommended that any employee who would come into contact with sewage should also be offered the Hepatitis A vaccination. This is a 2-dose vaccination that provides lifelong immunity. In addition, if a sharps injury occurs during work, Western Refining should contact the Epidemiology and Response Division at 827-0006. The call will be routed to Dr. Steve Jenison. In general, all employees should be encouraged to remain up to date on their vaccinations.

Please incorporate the above paragraph on vaccination requirements as an addendum to your Bio-Hazard Plan.

Please contact me if you have questions. I'm going to help Brad with responses to recent e-mails, documents, etc. Stay tuned... Thank you.

Carl J. Chavez, CHMM
New Mexico Energy, Minerals & Natural Resources Dept.
Oil Conservation Division, Environmental Bureau
1220 South St. Francis Dr., Santa Fe, New Mexico 87505
Office: (505) 476-3490
Fax: (505) 476-3462
E-mail: CarlJ.Chavez@state.nm.us
Website: <http://www.emnrd.state.nm.us/ocd/index.htm>
(Pollution Prevention Guidance is under "Publications")

From: Krapfl, Heidi, DOH
Sent: Wednesday, March 18, 2009 4:01 PM
To: Chavez, Carl J, EMNRD
Cc: Smelser, Chad, DOH
Subject: RE: Western Refining SW- Gallup Refinery (GW-032) - Bio-Hazard Plan

Carl-

I have reviewed the Biohazard Plan and overall it appears to be a good plan. I consulted with Dr. Chad Smelser of Infectious Disease Epidemiology and he provided some input. I want to stress that this input should not be construed as an endorsement by the Department of Health of the Plan. I think we already talked about this, but it doesn't hurt to re-iterate.

Dr. Smelser recommended that any employee who would come into contact with sewage should also be offered the Hepatitis A vaccination. This is a 2-dose vaccination that provides lifelong immunity. In addition, if a sharps injury occurs during work, Western Refining should contact the Epidemiology and Response Division at 827-0006. The call will be routed to Dr. Steve Jenison. In general, all employees should be encouraged to remain up to date on their vaccinations.

In the future, DOH would recommend that NM OSHA review any biohazard plan that might be required of a refinery's waste water treatment plant.

Let me know if you have any questions.
Heidi

From: Chavez, Carl J, EMNRD
Sent: Tuesday, March 03, 2009 4:07 PM
To: Krapfl, Heidi, DOH
Cc: Jones, Brad A., EMNRD; Rajen, Gaurav
Subject: Western Refining SW- Gallup Refinery (GW-032) - Bio-Hazard Plan

Heidi Krapfl
Department of Health
(505) 476-3577

Good afternoon. Per our telephone conversation today, the New Mexico Oil Conservation Division (OCD) would appreciate any comments that the NM Department of Health (DOH) would like to make on the submitted bio-hazard Plan for the above refinery by April 3, 2009.

As we discussed, the DOH review is optional, but would be appreciated in the event you identify any concerns based on the bio-hazard plan. The nearby Pilot Travel Center discharges its sanitary effluent into the Gallup Refinery Waste-Water Treatment Plant and is used in the remediation or breakdown of organics in the refinery treatment system. The OCD just wants to make sure that there is or are no bio-hazard issues based on the bio-hazard plan.

The OCD is currently reviewing the Bio-Hazard Plan submitted to the OCD by Western Refining SW- Gallup Refinery. Any comments on the bio-hazard plan would be appreciated. If the OCD does not receive comments from DOH, this shall not be misconstrued to mean that DOH has no concerns.

Please contact me if you have questions. Thank you in advance.

Carl J. Chavez, CHMM
New Mexico Energy, Minerals & Natural Resources Dept.
Oil Conservation Division, Environmental Bureau
1220 South St. Francis Dr., Santa Fe, New Mexico 87505
Office: (505) 476-3490
Fax: (505) 476-3462
E-mail: CarlJ.Chavez@state.nm.us
Website: <http://www.emnrd.state.nm.us/oed/index.htm>
(Pollution Prevention Guidance is under "Publications")