A guide to the

Toxic Release Inventory

for Nevada

State of Nevada

Department of Conservation and Natural Resources

Division of Environmental Protection

Introduction

In 1986, Congress passed the Emergency Planning and Community Right-to-Know Act (EPCRA). Section 313 of EPCRA, called the Toxic Release Inventory (TRI), requires specified industries to report releases of over 650 chemicals and chemical categories to air, land and water.

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TRI is designed to provide citizens with information about chemicals being used, processed, manufactured, or released from facilities in their communities. The basic premise of TRI is that citizens have a "right to know" about toxic chemicals that are handled or released in their community.

Due to the changes in reporting requirements, the mining and electric utility industries must now report TRI releases. The most recent TRI data (1998) for Nevada includes these industries, consequently reported releases are dramatically higher than previous years. This report is intended to serve as a guide to TRI for Nevada. It provides an overview of the TRI program, explains changes in reporting requirements and describes the processes in the mining and utility industries that account for the significant increase in reported releases in Nevada. Sources of additional information and ways to access TRI data are listed at the end of the report.

Overview of TRI Reporting Requirements

Facilities in specified industries are required to report to the U. S. Environmental Protection Agency if they have ten or more employees and exceed thresholds for chemicals on the TRI list. More than 25,000 pounds of a TRI chemical must be manufactured or processed, or more than 10,000 pounds otherwise used to trigger reporting for that chemical.

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The term "release" in the TRI program is very broad and includes permitted emissions and discharges, management of wastes in regulated disposal units as well as accidental spills and releases. Facilities are also required to report other waste management activities which occur on-site or which involve transfers of waste off-site.

"On-site releases" are TRI chemicals that are either emitted to the air, disposed of on-land, are discharged to surface waters or underground injection wells. "Off-site releases" are reported when wastes are shipped off-site for management in land disposal units.

In the past, Nevada's largest TRI reporters have been chemical manufacturers, composite plastic manufacturers and printing companies. Nevada ranked low in reported release quantities compared to other states. In the last reporting year, 1997, Nevada ranked 44th in

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the nation with 51 manufacturing facilities reporting approximately 4.4 million pounds of TRI chemical releases.

In 1997, the U. S. Environmental Protection Agency changed the TRI reporting requirements by adding seven additional industry sectors, including metal mining and electrical utilities. Facilities in these sectors were required to submit their first TRI report by July 1, 1999 for the 1998 reporting year. The U. S. Environmental Protection Agency is now releasing the 1998 TRI data to the public.

Due to the addition of mining, reported releases of TRI chemicals in 1998 exceed 1.3 billion pounds. This is more than 300 times the quantity of releases previously reported for the state. The majority of Nevada's reported releases are chemicals that are present in naturally occurring minerals contained in rock excavated from mine sites and are not the result of changes in environmental management or operating practices at mine facilities.

Uses of TRI Information

The majority of Nevada's reported releases are chemicals that are present in naturally occurring minerals contained in rock.

TRI information can be useful to the public, government agencies, and the facilities that report. Information about the chemicals used and released from TRI reporting facilities can help communities and the reporting facilities better plan to avoid potential problems and respond in the case of emergencies. Reporting facilities have worked with communities to help them better understand how the facility processes operate and what the reported releases represent.

Manufacturers have targeted particular toxic chemicals they report to TRI for waste reduction efforts. In many cases they have been able to modify their manufacturing process or substitute less hazardous chemicals to reduce or eliminate reported releases entirely. Government agencies and the public have used TRI data to assess progress that manufacturing facilities have made to prevent pollution or improve pollution controls.

Limitations of TRI Information

The chemicals included on the TRI list have been designated based upon potential human health or environmental impacts they can present if there is exposure to the chemicals. However, the TRI release data alone does not reflect exposure to these chemicals or potential risk. Actual exposure or risk would depend upon actual chemical concentrations and potential routes of exposure.

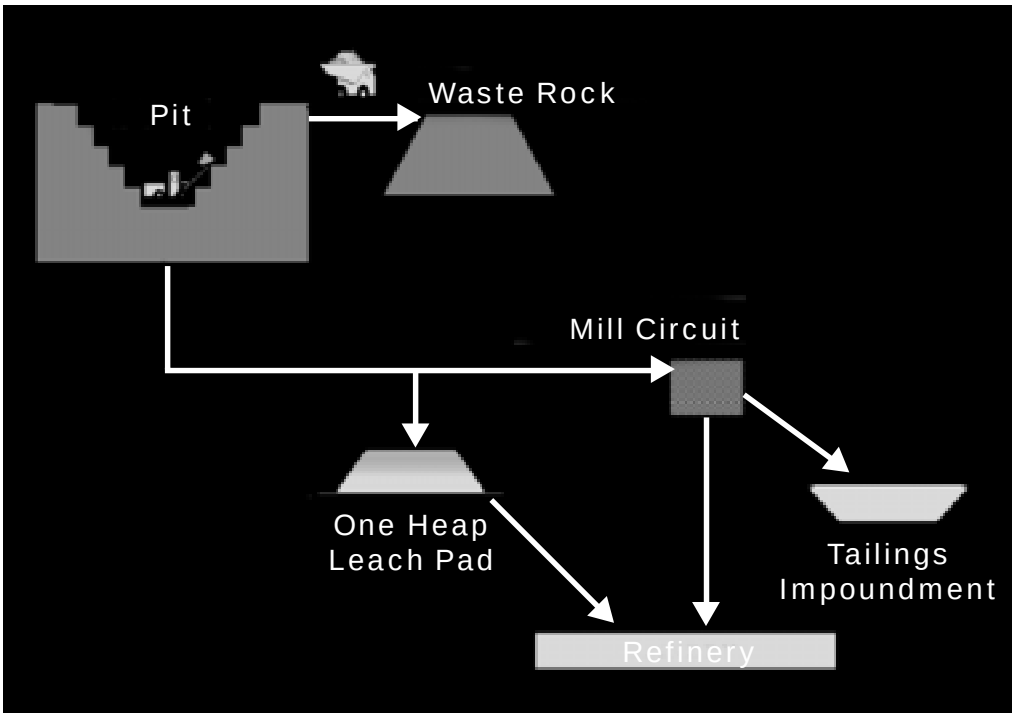
TRI does not require additional monitoring or measurements by facilities to determine release amounts. If measured data are not available, facilities may calculate release amounts using a variety of methods. Actual releases may vary considerably from the estimates derived by these computational methods. In addition, TRI data does not represent the concentration of a chemical release nor does it provide information about the mobility of the chemical in the environment.

It can also be difficult to discern meaningful trends in TRI data since changes in reported releases over time may be due to changes in economic conditions, changes in industry practices or changes in TRI reporting requirements. Obviously, the huge increase in reported releases for Nevada in 1998 is due to new reporting requirements that require the mining and utility sectors to submit TRI reports.

The huge increase of reported releases for Nevada in 1998 is due to new reporting requirements.

Mine Operations and TRI

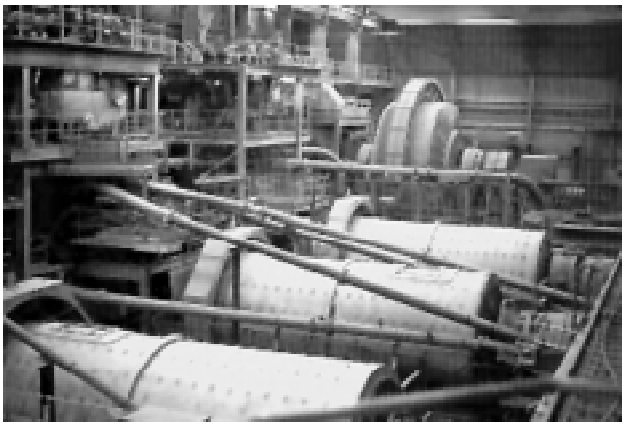
Most of Nevada's mines are gold and silver mines. A pit or underground mineshaft is excavated in order to access and remove the ore. This typically involves drilling holes and blasting the rock. The ore is leached using a dilute cyanide solution in order to recover the gold and silver.



Reported Land Releases

Mill Circuit and Tailings

Residual materials from milling and leaching of ores in the mill circuit are managed in a tailings impoundment at the mine site. The tailings impoundment may contain trace quantities of metals present in the ore such as antimony, arsenic, cadmium, cobalt, copper, lead, mercury, selenium, silver, thallium, and zinc. In addition, chromium, manganese, and nickel compounds may be present in tailings impoundments. These metals are present in metal alloys used for linings, balls or rods, and other wear parts in milling operations. As these components become ground or worn away in the mills, the metal particles are contained in the grinding slurries discharged to the tailings impoundment.



The tailings impoundment is constructed with an engineered clay or plastic liner to prevent discharges and operates under a Water Pollution Control Permit issued by the Nevada Division of Environmental Protection. The permits prohibit discharge of any untreated process waters and in most cases require zero discharge.

TRI chemicals are reported as releases to mine tailings impoundments. This represents about 31 percent of the releases from mine sites.

Various chemical reagents are added to the slurry discharged to the tailings impoundment to destroy the cyanide. The cyanide destruction process results in ammonia in the tailings impoundment, and some air release of ammonia from the impoundment. Nitrate compounds in the tailings impoundment may also result from the cyanide destruction.

The metals and other TRI chemicals in the ore residuals managed in tailings impoundments are reported to TRI as releases to "Surface Impoundments." Altogether, 400 million pounds of TRI chemicals are reported as releases to mine tailings impoundments. This represents about 31 percent of the releases from mine sites.

Heap Leach Pads

Lower grade ore normally does not go through the milling operations but is placed on a heap leach pile. The pile is constructed on a lined heap leach pad, which is regulated under a Water Pollution Control Permit from the Nevada Division

of Environmental Protection. A dilute cyanide solution is percolated through the pile to dissolve the gold and silver. The gold and silver bearing cyanide solution is collected on the liner at the base of the heap for recovery of these metals.

When a mine site closes or a heap leach pad is decommissioned the cyanide solution in the heap is neutralized or treated to safe levels. The heap is required to be reclaimed and revegetated for return to future productive use. When a heap leach pad is decommissioned the trace metals remaining in the leached ore on the pad are reported to TRI as "other" land releases as is waste rock.

TRI metals in mining waste rock and in ore residuals managed onsite accounts for well over 97% of all TRI releases reported from mines sites.

Waste Rock

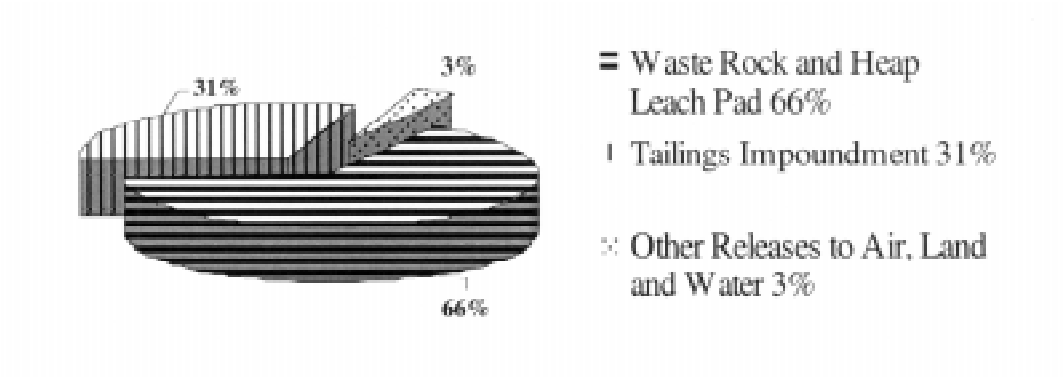
Rock that does not contain recoverable gold and silver must be removed to access the rock containing ore. The non-ore bearing rock or "waste rock" is managed on site in piles. Trace concentrations of naturally occurring TRI chemicals such as antimony, arsenic, cadmium, cobalt, copper, lead, mercury, selenium, silver, thallium, and zinc compounds may be present in minerals in the waste rock. In addition, trace amounts of methanol, propylene, and ethylene glycol may be present in waste rock since these substances may be used for antifreeze protection in either water sprays for dust control or for drilling fluids.

Nevada Water Pollution Control regulations apply to waste rock piles, along with other mine site components, to ensure waters of the state are not degraded. In addition, mine reclamation regulations administered by the Division of Environmental Protection require that waste rock piles be reclaimed and revegetated to provide a productive post-mining land use.

Even though the TRI substances in waste rock and heap leach piles are present only at trace concentrations, the large volumes of rock that are excavated at mine sites result in 860 million pounds of releases being reported to TRI as "other" land disposal. The metals in the minerals in the waste rock and heap leach ore represent about 66 percent of the TRI releases reported from Nevada mines.

Combined, the TRI substances in mining waste rock and in ore residuals managed onsite account for well over 97% of all TRI releases reported from mines sites. Other TRI reported releases from mining operations to air, land, and water account for less than one percent of mine releases.

TRI Reported Mine Releases



Reported Air Releases

Mines operate under the Air Pollution Control Permit conditions issued by the Nevada Division of Environmental Protection according to the provisions of the Federal Clean Air Act Amendments of 1990.

Non-point Source Emissions

Some metal compounds are contained in the dust (or particulate matter) that is wind blown off of heap leach pads, waste rock or ore stockpiles. The metal compounds in this dust are reported as non-point source air releases. Air pollution control permits require management practices to minimize these emissions.

Some hydrogen cyanide is formed when cyanide leach solutions are exposed to the air (for instance on the heap leach pad) and this is reported as a non-point source air emission. While hydrogen cyanide might be detectable at the surface of a heap or tank, concentrations in ambient air are not likely to be high enough to pose any human health risk. State and Federal occupational safety regulations are intended to protect workers from harmful exposure to such toxic substances. Ammonia is also reported as a non-point source air release from tailings impoundments as a result of the cyanide destruction treatment process.

Methanol, propylene, and ethylene glycol are all used for antifreeze protection in either water sprays for

dust control or for drilling fluids. Some of these chemicals may be reported as non-point source releases to the air.

Stack or Point Source Emissions

Air releases that come from discrete points at the mine or from stacks or pipes are reported as stack or point source emissions. Metal compounds in the dust that comes from crushers, and conveyor drop points are reported as point source emissions.

Mines with roasters or autoclaves – used to oxidize certain types of ore to facilitate leaching – may report stack releases of chemical byproducts of fuel combustion and small quantities of metals. Mercury releases may be reported from retort, roasters, and refineries. Roasters, autoclaves, and mercury retort are required to operate under specific optimum conditions and scrubbers are used to control emissions in accordance with Air Pollution Control Permits.

All of the reported mine site air releases combined account for 0.1 percent of reported mine releases or about 1.5 million pounds.

Reported Water Releases

Mineshafts and pit excavations may come into contact with groundwater, requiring dewatering to enable further mining. The TRI releases reported to water, such as nitrate and metal compounds, represent naturally occurring substances found in the groundwater that is discharged during dewatering. Ammonia may be contributed by biological activity in cooling ponds prior to discharge of the groundwater.

Mine dewatering accounts for 236,000 pounds of reported TRI releases to water of about 0.02 percent of total reported mine releases. Water Pollution Control Permits, which are intended to prevent degradation of waters of the state, govern discharges from mine dewatering.

Electric Utility Operations and TRI

Coal and oil fired electric power plants have similar operations and features regardless of the fuel. Large quantities of coal or oil are burned to heat steam. The steam turns a turbine, which generates electrical power. The steam is then cooled, condensed, and re-circulated through the process.

Reported Air Releases

TRI releases from utilities result from chemicals that are present in the coal or oil they burn as fuel. Chloride, fluoride, and sulfur are present

at low concentrations in coal or oil. When the fuel is burned these chemicals form hydrochloric acid, hydrogen fluoride, and sulfuric acid aerosols. Metals such as barium, copper, chromium, lead and zinc are also present in trace quantities in coal or oil and a portion of these metals are released to the air when the fuel is burned. Approximately 1.2 million pounds of these chemicals are reported to TRI as stack air releases, which accounts for about 40 percent of all reported releases from electric utilities.

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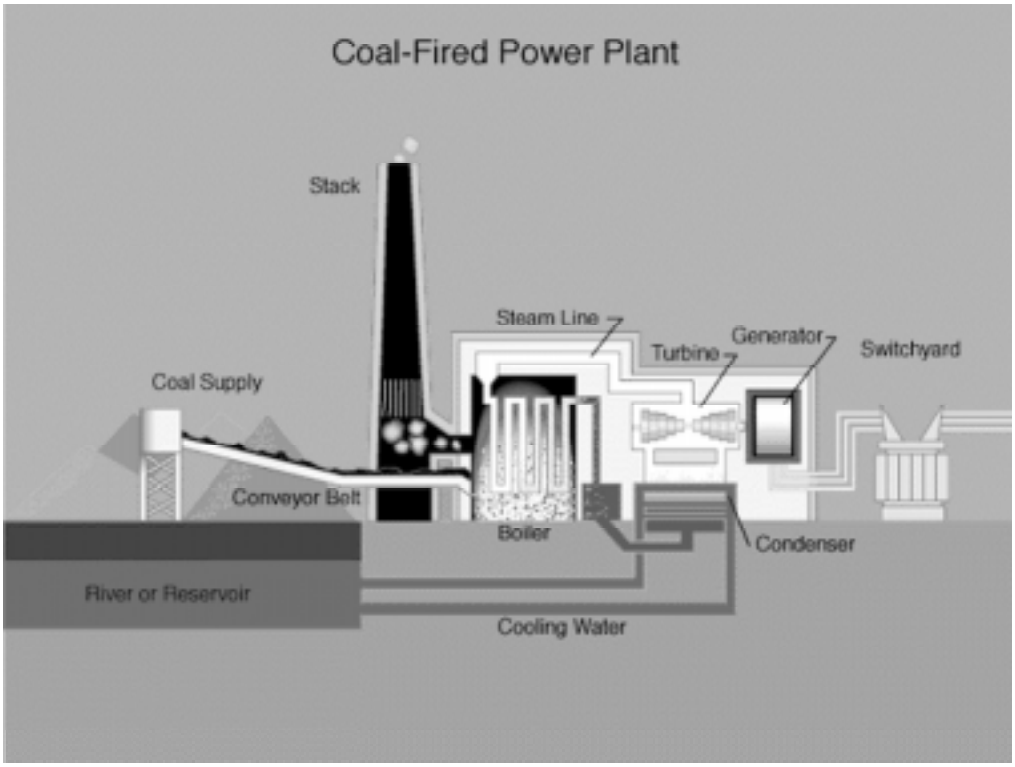
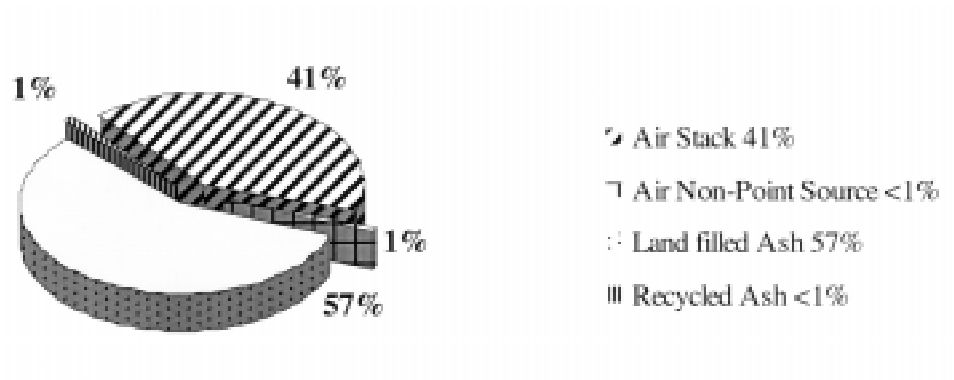


Ammonia is used at power plants to treat process waters in order to protect against corrosion of plant furnaces and cooling towers. Ammonia from this process may be reported to TRI as a non-point source release to the air. This results from exposure of the treated water to the atmosphere.

Electric utilities are regulated under air pollution control permits issued by the Nevada Division of Environmental Protection in accordance with Title V of the Federal Clean Air Act. The permits limit emissions of regulated pollutants to concentrations and total emissions that are designed to meet health based standards.

TRI Reported Releases–Electric Utility



Reported Land Releases

Ash, which contains most of the metal compounds from the fuel that is burned, is disposed of in landfills on-site. The landfills are approved by the Nevada Division of Environmental Protection (or Clark County) as Class III disposal sites. The metals in the ash are reported to TRI as on-site landfill releases.

At some facilities wet fly ash wastes may also be managed in lined surface impoundments and metals they contain are reported to TRI as land releases. The surface impoundments are regulated by Water Pollution Control Permits which prohibit any discharge of process waters from Nevada's electric utilities to surface or groundwater.

Approximately 1.7 million pounds of metals are present in ash disposed of on-site, which accounts for about 57% of all reported releases from electric utilities.

On-line Access

Envirofacts provides integrated data extracted from five major EPA programs, including TRI. The database allows users to search for information about specific facilities or geographic location. The Envirofacts site is located at ***http://www.epa.gov/enviro/***

RTK Net contains information from multiple environmental databases, including TRI, that can be searched by facility, location, chemical and other variables such as Standard Industrial Classification (SIC) code. The RTK Net site is located at ***http://www.rtknet.org***

CD-ROM Access

The entire Toxic Release Inventory database is published by EPA on CD-ROM. The CD-ROM contains information on toxic releases in the U.S. and is searchable across more than 200 fields including company name, address, zip code and chemical name. The CD-ROM also contains TRI State Fact Sheets, the TRI reporting forms and Chemical Fact Sheets on many of the TRI chemicals.

Non-profit groups can obtain the CD-ROM at no cost from the following sources:

National Service Center for Environmental Publications
P.O. Box 42419
Cincinnati, OH 45242
Phone: (800) 490-9198
Fax: (513) 489-8695
Hours: 7:00 a.m. - 5:30 p.m. (EST)

Internet: www.epa.gov/ncepihom/

TRI User Support
401 M Street SW
Washington, D.C. 20460
Phone: (202) 260-1531
Hours: 7am- 5:30 p.m (EST)
Ask for the TRI CD-ROM

Businesses may purchase TRI CD-ROMs from the following sources

National Technical Information Office Service (NTIS)
5285 Port Royal Road
Springfield, VA 22161
Phone: (800) 553-6847; (703) 605-6000
Fax: (703) 605-6900
E-mail:orders@ntis.fedworld.gov
Hours: 8:00 a.m.-6:00 p.m. (EST)

Internet:
www.ntis.gov/fcpc/cpn6475.htm

U.S. Government Printing (GPO) Superintendent of Documents
P.O. Box 371964
Pittsburgh, PA 15250-7954
Phone: (202) 512-1800
Fax: (202) 512-2233
Hours: 8:30 a.m.- 4:00 p.m. (EST)
Internet:
www.access.gpo.gov/su_docs

Public Data Release Reports and State Fact Sheets

Public Data Release Reports, which are published annually by the US EPA to coincide with the release of TRI data to the public, provide summaries, analyses and comparison of TRI data by year. The annual report contains detailed analyses and supporting tables for releases and other waste management of TRI chemicals; geographic distribution of TRI releases; industrial patterns of releases and other waste management; the interstate and intrastate transport of TRI chemicals; chemicals with the largest releases and other waste management; and other topics. The reports can be viewed on the EPA web page, printed, or downloaded (in PDF format) by section or by entire report. Annual reports are available from:

US EPA EPCRA Hotline
Phone: (800) 424-9346
Internet: www.epa.gov/opptintr/tri/

The two-page State Fact Sheets, are also published annually. They contain key TRI report data, including information about the reporting facilities; chemicals for which the most releases were reported; the number of state facilities reporting and the total reports received; total state releases and waste management reported by medium. The report also lists the names and telephone numbers of state and regional TRI coordinators. Copies of this report are available free, while supplies last, from:

National Service Center for
Environmental Publications (NSCEP)
Phone: (800) 490-9198 or Fax: (513) 489-8695
Ask for EPA publication 745-F-99-001
Internet: www.epa.gov/opptintr/tri/

Hard Copy Access

The US EPA has distributed the Toxic Release Inventory to more than 3,000 public libraries across the country. Ask your local public library or University of Nevada and Community College Library System librarian to assist you in locating a copy of the TRI information that is available to the public.

The Nevada Division of Environmental Protection maintains copies of all TRI reports which have been submitted by reporting facilities in Nevada. Copies of reports for a particular facility are available free of charge by contacting:

Alene Coulson
Nevada Division of Environmental Protection
Bureau of Waste Management
333 West Nye Lane, Room 138
Carson City, NV 89706-0851
Phone: (775) 687-4670 ext. 3006
Fax: (775) 687-6396
E-Mail: acoulson@ndep.carson-city.nv.us

Additional Contacts

For general TRI Program information in US EPA Region 9, which includes NV, CA, AZ, HI and Guam, access the Region 9 website at www.epa.gov/region09/toxic/tri/ or contact:

Adam Browning
US EPA Region IX
75 Hawthorne Street
San Francisco, CA 94105
Phone (415) 744-1121

For information concerning environmental regulatory programs administered by the Nevada Division of Environmental Protection, access the website at www.state.nv.us/ndep/ or contact:

Bureau of Air Quality, Colleen Cripps, (775) 687-4670 ext. 3065

Bureau of Mining Regulation and Reclamation, Dave Gaskin, (775) 687-4670 ext. 3134

Bureau of Water Pollution Control, Leo Drozdoff, (775) 687-4670 ext. 3142

Bureau of Waste Management, David Emme, (775) 687-4670 ext. 3001

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