

**Joint UNEP/OCHA Environment Unit**  
**Environmental Risk Identification**  
**Tropical Storm Olga- Dominican Republic- 14 December 2007**

*Disclaimer*

*This profile is not a conclusive list. Other risks may be possible from sources that are not readily identifiable. The information sources used are public websites. All efforts are made to screen the websites for accuracy.*

**Objective:**

The objective of the Environmental Risk Identification (ERI) is to alert the UN Country Team after the natural disaster to potential secondary risks posed by large infrastructure and industrial facilities containing hazardous materials located in the affected area. This information can be shared with competent local and national authorities as appropriate. Any actual secondary risk should be addressed at the earliest possible stage.

**Event:** Tropical Storm Olga has claimed the lives of 11 people in the Dominican Republic. Some 35,280 persons were evacuated, 3,727 are in shelters; 6,763 houses were damaged, 36 destroyed and 76 communities are isolated.

**Summary of findings:**

The following large infrastructure and industrial facilities may pose a risk:

Facility	Location	Hazardous material	Hazard
<b>Oil and Gas infrastructure</b>			
Refinery	- Bona0 by Falcondo - Haina by Refinería Dominicana de Petróleo	Petroleum hydrocarbons, hydrogen sulphide, metals, polychlorinated biphenyls (PCV), acids and alkalis, ethylene, propylene, mercaptan, benzene, liquefied natural gas and other combustibles	Flammable, Toxic, Corrosive, Spontaneously combustible and Explosive
<b>Electric power stations</b>			
140-megawatt powerplant	To support mining activities at Pueblo Viejo (was planned in 2005)	Ammonia (cooling), Fuel	Toxic Gas, Flammable
<b>Agro/Food Industry</b>			
Sugar Industry	<i>These facilities are expected to be present in the affected area, but an exact location could not be specified</i>	Sulphur dioxide	Toxic gas
Cocoa, chocolate and coffee industry		Hexane, Ammonia	Flammable, toxic
Large cooling facilities (slaughterhouses, dairy products, fat, fish and meat, breweries, refrigerated warehouses, etc.)		Ammonia, Freons and Sulphur dioxide	Toxic Gas, Corrosive
Meat processing		Hexachlorobenzene	Liquid toxic/persistent
Dairy products		Chlorine dioxide	Liquid toxic/persistent
<b>Chemical Industry</b>			
Textiles	<i>These facilities are expected to</i>	Benzene, naphtalene, acids, alkalis, chlorine, bromine, sodium	Flammable, Toxic, Corrosive, Oxidizing

	<i>be present in the affected area, but an exact location could not be specified</i>	nitrate, ammonia, sodium sulphide, metals, lye, dyes, solvents, formic acid	
<b>Hazardous Waste</b>			
Recovery/recycling/re-use facilities	Bacterías Cometas, Zona Industrial de Haina, Santo Domingo; Recycle of Batteries;	Various chemical products	High Toxic
<b>Public Areas and Services</b>			
Hospitals	<i>These facilities are expected to be present in the affected area, but an exact location could not be specified</i>	Mercury, radioactive sources, solvents, compressed gases, infectious substances, oxygen, ethylene oxide and various solvents	Toxic, Radioactive, Flammable, Infectious
<b>Specific Basic Industry</b>			
Cement Plants	<i>These facilities are expected to be present in the affected area, but an exact location could not be specified</i>	Incineration of hazardous waste, Cement plants use fuels like coal, oil, petroleum coke and natural gas	Flammable, corrosive, toxic
<b>Large infrastructure</b>			
Large hydro dams	<ul style="list-style-type: none"> <li>- Bao near Iglesia on the river Bao</li> <li>- Jigüey near Palo de Caja on the river Nizao</li> <li>- Sabana Yegua near Los Bancos on the river Yaque del Sur</li> <li>- Tavera near Tavera on the river Yaque del Norte</li> <li>- Valdesia near Valdesia on the river Nizao</li> <li>- Sabaneta near Sabaneta on the river San Juan</li> <li>- Hatillo near Coimi on the river Yuna</li> <li>- Rincon near Rincon on the river Jima</li> <li>- Agguacate near Paso el Ermitano on the river Nizao</li> <li>- Maguaca near Santa Cruz on the river Maguaca</li> <li>- Chacuey near Santa Cruz on the river Chacuey</li> </ul>	-	Dam stability might be affected, dammed water, high voltage electricity
<b>Mining activities</b>			
Polymetallic deposits (copper, zinc, silver, gold)	See below	<ul style="list-style-type: none"> <li>- Any mine can use fuels, explosives, metals, ammonium nitrate</li> <li>- Gold mines use</li> </ul>	Liquid toxic/persistent, carcinogenic, toxic

		mercury, cyanide, arsenic - Non-precious metals (copper, nickel, cobalt and molybdenum) may use arsenic, cyanide	
<ul style="list-style-type: none"> <li>- Cerro de Maimon is located in the municipality of Maimon in the Nouel Province about 70 km northwest of Santo Domingo (contains a sulfide circuit to produce copper concentrates)</li> <li>- Pueblo Viejo gold and silver mine</li> <li>- Neita, northwest Dominican Republic</li> <li>- Las Palmas, San Juan province</li> <li>- Los Comios, a remote area in the far western Dominican Republic close to the Haitian border</li> <li>- Loma Viejo Piedro, a remote area in the far western Dominican Republic close to the Haitian border south of the Las Tres Palmas Project</li> <li>- Sabaneta Fiscal Reserve</li> <li>- Josefina, Sanchez Ramirez province</li> <li>- La Comadreja, east central Dominican Republic on the Los Ranchos formation</li> <li>- Longyear, central Dominican Republic, approximately 55 km northwest of the capital of Santo Domingo</li> <li>- Bacco y Ofir, located in the Monte Plata and Hato Major provinces</li> <li>- Los Pedregones, west of the regional Bonao Fault</li> <li>- Rey Midas, Los Ranchos Formation, which hosts the Pueblo Viejo deposit approximately 55 km east of Pueblo Viejo.</li> <li>- San Antonio, Maimon Formation, in the central Dominican Republic</li> <li>- Las Animas, just over 100 km north-west of the capital Santo Domingo</li> <li>- El Centenario concession is located in the central Dominican Republic, approximately 77 km northwest of the capital of Santo Domingo</li> <li>- Oro Verde, Monseñor Nouel province</li> <li>- El Toro, northern Dominican Republic</li> </ul>			
<b>General risks of mining activities:</b>			
<i>Possible type of incident</i>	<i>Typical cause of accidents possibly aggravated by the floods</i>	<i>Potential effects</i>	
Tailings dam failure	Poor water management, overtopping, foundation failure, drainage failure, piping, erosion, earthquake	Loss of life, contamination of water supplies, destruction of aquatic habitat and loss of crops and contamination of farmland, threat to protected habitat and biodiversity and loss of livelihood	
Failure of waste rock dump	Instability often related to presence of water (springs, poor dump drainage)	Loss of life, injuries, destruction of property, damage to ecosystems and farmland	
Pipeline failure, e.g. tailings, leach solution	Inadequate maintenance, failure of equipment, physical damage to pipeline	Contamination of soil, water, effects on water users. May not be detected for some time.	
Transport of chemicals to/from site	Inadequate transport procedures and equipment, unsafe packaging, high-risk transportation routes	Contamination of soil, water, effects on water users, aquatic ecosystem damage, threat to human health	
Ground substance	Slope failure, breakthrough to surface	Loss of life, damage to property	
Spills of chemicals at site, e.g. fuel tank rupture, reagent store damage	Poor maintenance, inadequate containment	Contamination of soil and water. Air pollution could have health effects	
Fire	Poor design, unsafe practices in relation to flammable materials	Effects of air pollution on health, property damage	
Atmospheric releases	Inadequate design, failure to follow procedures, inadequate maintenance	Community concern, possible health effects	
Explosions (plant)	Inadequate design, failure to follow procedures, inadequate maintenance	Community concern, loss of life, destruction of property	
Blasting and explosives accidents	Poor practice, unsafe storage and handling	Property damage, risk to life	

**The Joint UNEP/OCHA Environment Unit :**

The Joint UNEP/OCHA Environment Unit is the United Nations mechanism to mobilize and coordinate the international response to environmental emergencies caused by natural disaster, technological accidents and complex emergencies.

**Information sources:**

Infrastructure Risks	Source of information
Nuclear Facilities	<ul style="list-style-type: none"> <li>• <a href="http://www.iaea.org/programmes/a2/index.html">http://www.iaea.org/programmes/a2/index.html</a></li> <li>• <a href="http://www-pub.iaea.org/MTCD/publications/PDF/cnpp2003/CNPP_Webpage/pages/countryprofiles.htm">http://www-pub.iaea.org/MTCD/publications/PDF/cnpp2003/CNPP_Webpage/pages/countryprofiles.htm</a></li> <li>• <a href="http://www.iaea.org/worldatom/rrdb/">http://www.iaea.org/worldatom/rrdb/</a></li> <li>• <a href="http://www.grid.unep.ch/data/download/gnv181.gif">http://www.grid.unep.ch/data/download/gnv181.gif</a></li> <li>• <a href="http://www.worldenergy.org/wec-geis/publications/reports/ser/nuclear/nuclear.asp">http://www.worldenergy.org/wec-geis/publications/reports/ser/nuclear/nuclear.asp</a></li> </ul>
Large hydrodams.	<ul style="list-style-type: none"> <li>• <a href="http://www.worldenergy.org/wec-geis/publications/reports/ser/hydro/hydro.asp">http://www.worldenergy.org/wec-geis/publications/reports/ser/hydro/hydro.asp</a></li> </ul>
Large Chemical/Industrial Industries	<ul style="list-style-type: none"> <li>• <a href="http://www.pops.int/documents/implementation/nips/submissions/default.htm">http://www.pops.int/documents/implementation/nips/submissions/default.htm</a></li> <li>• <a href="http://www.chem.unep.ch/pops/pcdd_activities/inventories/default.htm">http://www.chem.unep.ch/pops/pcdd_activities/inventories/default.htm</a></li> </ul>
Gas/Oil: Refineries, Pipelines, explorations sites	<ul style="list-style-type: none"> <li>• <a href="http://www.eia.doe.gov/emeu/cabs/index.html">http://www.eia.doe.gov/emeu/cabs/index.html</a></li> <li>• <a href="http://www.worldenergy.org/wec-geis/publications/reports/ser/gas/gas.asp">http://www.worldenergy.org/wec-geis/publications/reports/ser/gas/gas.asp</a></li> <li>• <a href="http://www.lib.utexas.edu/maps/map_sites/oil_and_gas_sites.html">http://www.lib.utexas.edu/maps/map_sites/oil_and_gas_sites.html</a></li> </ul>
Mining activities	<ul style="list-style-type: none"> <li>• <a href="http://www.worldenergy.org/wec-geis/publications/reports/ser/coal/coal.asp">http://www.worldenergy.org/wec-geis/publications/reports/ser/coal/coal.asp</a></li> <li>• <a href="http://www.worldenergy.org/wec-geis/publications/reports/ser/uranium/uranium.asp">http://www.worldenergy.org/wec-geis/publications/reports/ser/uranium/uranium.asp</a></li> <li>• <a href="http://minerals.usgs.gov/minerals/pubs/country/2005/mzmyb05.pdf">http://minerals.usgs.gov/minerals/pubs/country/2005/mzmyb05.pdf</a></li> <li>• <a href="http://www.camec-plc.com/Investors_Media/RNS/2004/rns_025.php">http://www.camec-plc.com/Investors_Media/RNS/2004/rns_025.php</a></li> <li>• <a href="http://www.energold.com/s/DR.asp">http://www.energold.com/s/DR.asp</a></li> </ul>
Hazardous waste storage sites	<ul style="list-style-type: none"> <li>• <a href="http://www.basel.int/natreporting/compilations.html">http://www.basel.int/natreporting/compilations.html</a></li> </ul>
	<ul style="list-style-type: none"> <li>• Conseil pour la réduction des accidents industriels majeurs (CRAIM). <i>Risk Management Guide for Major Industrial Accidents intended for municipalities and industry</i>. 2002 Edition.</li> <li>• International Atomic Energy Agency (IAEA). <i>Manual for the classification and prioritation of risks due to major accidents in process and related industries. Inter-agency Programme on the Assessment and Management for Health and Environmental Risks from Energy and other Complex Industrial Systems</i>. 1996.</li> <li>• UNEP Industry and Environment (IE). <i>Hazard Identification and evaluation in a local community. Technical report n°12</i>. 1998.</li> <li>• UNDAC <i>Field Handbook</i></li> <li>• <i>Emergency Response guidebook 2004. A guidebook for first responders during the initial phase of a dangerous goods/hazardous materials incident</i>.</li> <li>• UNEP. <i>APELL for Mining. Guidance for the Mining industry in raising awareness and preparedness for emergencies at local level. Technical report N°41</i>. 2001</li> </ul>

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