Intel Landscape Chemical Usage
August 2007

Integrated Pest Management:
Integrated Pest Management (IPM) is an effective and environmentally sensitive approach to pest management that relies on a combination of common-sense practices. IPM programs use current, comprehensive information on the life cycles of pests and their interaction with the environment. This information, in combination with available pest control methods, is used to manage pest damage by the most economical means, and with the least possible hazard to people, property, and the environment. IPM takes advantage of all appropriate pest management options including, but not limited to, the judicious use of pesticides.

Background on Herbicides:
The herbicides used on the Intel NM site can be broken into two categories: pre-emergence and post-emergence. Pre-emergence herbicides are those herbicides used as a preventative measure, prior to weed growth. Pre-emergence herbicides are more frequently and abundantly used on the Intel site. Post-emergence herbicides are used to kill weeds after they have surfaced. Post-emergence herbicides are used sparingly and less frequently on site. A detailed list of the various herbicides used on site follows below.

Herbicides Used on Site:

Pendulum ® AquaCap™ Herbicide (BASF Corporation)
General Description/Usage: Pre-emergence herbicide used in both grass and rock areas. This is the most widely used herbicide on site with approximately 2 applications per year. In each application there are 0.75 gallons of Pendulum AquaCap herbicide used. This is mixed with 100 gallons of water.
Active Ingredient: Pendimethalin (EPA Reg. No.: 241-416), 37.4%.
EPA fact sheet: http://www.epa.gov/oppsrrd1/REDs/factsheets/0187fact.pdf
EXTOXNET fact sheet: http://extoxnet.orst.edu/pips/pendimet.htm

- These agents are selective pre-emergence dinitroaniline herbicides used against several annual grasses and many broad-leaf weeds. They affect seed germination and prevent weed growth by inhibition of root and shoot development (HSDB , 2002) (Hartley & Kidd, 1987).
- This class of herbicides is of relatively low toxicity to humans via all routes of exposure. Most of these herbicides are classified in WHO and EPA Toxicity as Class III. There has been little in the way of acute poisoning or adverse effects reported after human exposure despite wide usage. Animal studies have confirmed the relatively low toxicity in vertebrates.
- Exposure to dinitroaniline herbicides is generally NOT expected to result in significant toxicity.
- Pendimethalin is strongly adsorbed to soil organic matter and clay and does not leach.

Speed Zone ® (PBI/Gordon Corporation)
General description/Usage: Post-emergence, broadleaf herbicide for turf areas, with approximately 2 applications per year. Each application consists of ~1 gallon Speed Zone and 99 gallons water.

Active Ingredient: 2,4-Dichlorophenoxyacetic acid, isooctyl (2-ethylexyl) ester (EPA Reg. No.: 2217-833), 28.57%.
EPA fact sheet: http://www.epa.gov/oppsrrd1/REDs/factsheets/24d_fs.htm
EXTOXNET fact sheet: http://extoxnet.orst.edu/pips/24-D.htm

- 2,4-D is one of the most extensively used systemic herbicides, and its use in agricultural applications is the primary source of environmental release. Over 1500 registered products contain 2,4-D as an active ingredient. (Howard, 1991)
- 2,4-D is classified in Group 2B (possibly carcinogenic to humans) by the IARC. The EPA lists it as a group D carcinogen (not classifiable to human carcinogenicity). Chronic exposure may result in weakness, fatigue, headache, vertigo, anorexia, nausea, eye and nasal irritation, skin irritation, bradycardia, and hypertension. Chronic exposure has also been reported to cause liver, kidney, and CNS damage. Peripheral neuropathy has also been reported.
- The likelihood of 2,4-D contaminating groundwater by leaching from soil is limited by the rapid degradation in soil and by its uptake by target plants. Residues detected in groundwater were mostly associated with point sources such as mixing, loading, and disposal (EPA, 1990).
- 2,4-D is not persistent in soil, lasting for 30 days at its highest application rate, though it has been reported that 2,4-D can have an effect on susceptible plants for up to 4 weeks following application. It will be taken up from the soil by the targeted plants where metabolism is usually slow and varies among plant species. Soil microbes are responsible for its eventual disappearance from soil, and biodegradation is a very important fate mechanism in most soil types. Rapid degradation by soil microorganisms occurs, with rates affected by contaminant concentration, water content, temperature, organic content of the soil, and prior exposure of the local soil microbes to 2,4-D or its esters (EXTOXNET, 2002)(Hartley & Kidd, 1990)(Howard, 1991)(NPTN , 2002)(OHM/TADS , 2002)(USDA , 2002).

RoundUp Pro ® (Monsanto Chemical Company)
General description/Usage: Post-emergence herbicide used for rock areas (used mainly in sidewalk areas on site). RoundUp Pro is used in small quantities and is dispensed via backpack sprayer (approximately 1 gallon herbicide is used every 2 years).
Active Ingredient: Glyphosate, Isopropylamine salt of N-(phosphonomethyl) glycine, in the form of its isoproplyamine salt (EPA Reg. No.: 524-475), 41.0%.
EPA fact sheet: http://www.epa.gov/oppsrrd1/REDs/factsheets/0178fact.pdf
EXTOXNET fact sheet: http://extoxnet.orst.edu/pips/glyphosa.htm

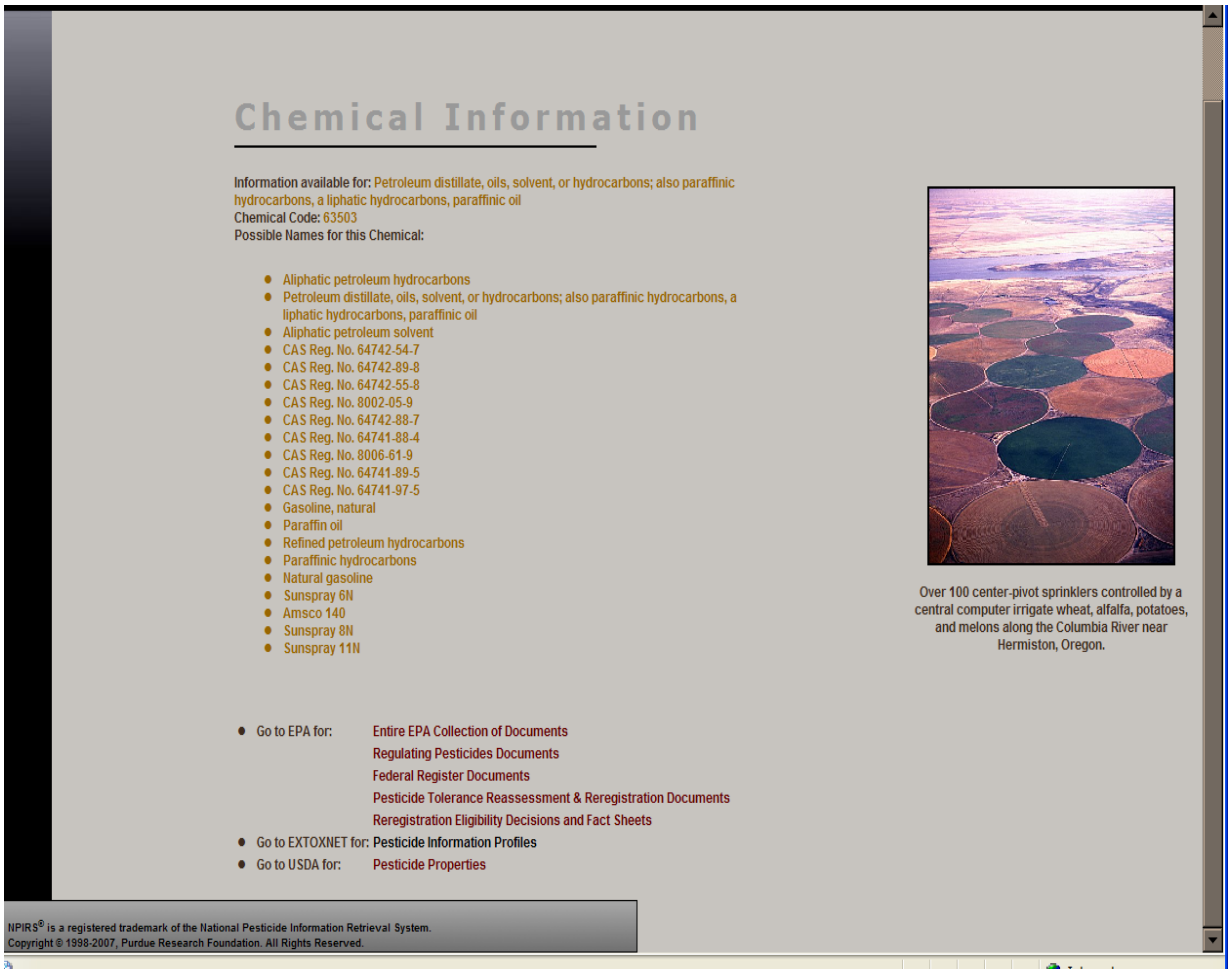
- Glyphosate is released to the environment in its use as a non-selective, post emergent herbicide for controlling woody and herbaceous weeds on forestry, right-of-way, cropped and non-cropped sites. It is applied as a spray of the isopropylamine salt and is removed from the atmosphere by gravitational settling. After glyphosate is applied to forests, fields, and other land by spraying, it is strongly adsorbed to soil, remains in the upper soil layers, and has a low propensity for leaching. Glyphosate readily and completely biodegrades in soil. Its average half-life in soil is about 60 days. Biodegradation in foliage and litter is somewhat faster. In field studies, residues are often found the following year. Glyphosate may enter aquatic systems through accidental spraying, spray drift, or surface runoff. It dissipates rapidly from the water column as a result of adsorption and possibly biodegradation. The half-life in water is a few days. Sediment is the primary sink for glyphosate. After spraying, glyphosate levels in sediment rise and then decline to low levels in a few months. Glyphosate does not bioconcentrate in aquatic organisms or bioaccumulate in species in higher tropic levels. Occupational workers and home gardeners may be exposed to glyphosate by inhalation and dermal contact during spraying, mixing, and cleanup. They may also be exposed by touching soil and plants to which glyphosate was applied. Occupational exposure may also occur during glyphosate's manufacture, transport storage, and disposal.

Insecticides Used on Site:
The insecticides used on site include Astro Insecticide (FMC Corporation), Merit 75 WSP (Bayer) which are both common insecticides (Merit is available at Home

Depot, for example). Insecticides are used on an as-needed basis when insects are prevalent in the landscaped areas, and are used in small quantities.

Mite-E-Oil™ (Helena Chemical Company)
General description/Usage: Mite-E-Oil is a special Blend of refined phytobland oils that function as a contact insecticide and miticide. In addition, the surfactant/emulsifier system utilized in Mite-E-Oil improves spray application by modifying the wetting and deposition characteristics of the spray droplets.
Active Ingredient: Petroleum Oil (EPA Reg. No.: 5905-302), 90%:

- This blend of paraffinic oils contains no pesticide or residues. Its mode of operation is to coat and suffocate the egg and larval stages of insect development.



Astro ® Insecticide (FMC Corporation)
General description/Usage: For use to control insect pests on lawns, ornamental trees and shubs and around buildings for perimeter insect control including landscaped areas around residential, institutional, public, commercial and industrial buildings, parks, recreational areas and athletic fields.
Active Ingredient: Permethrin (EPA Reg. No.: 279-3141), 36.8%.
EPA fact sheet: http://www.epa.gov/oppsrrd1/REDs/factsheets/permethrin_fs.htm

EXTOXNET fact sheet: http://extoxnet.orst.edu/pips/permethr.htm

- Chronic Effects from Overexposure: In studies with laboratory animals, Permethrin did not cause reproductive toxicity or teratogenicity.
- Physical/Environmental Properties: In soil, Permethrin is stable over a wide range of pH values. When applied at agricultural use rates, Permethrin has a moderate rate of degradation in soil. Due to its high affinity for organic matter, there is little potential for movement in soil or entry into ground water.

Merit 75 WSP (Bayer)

General description/Usage: For foliar and systemic insect control in turfgrass (including sod farms), landscape ornamentals, fruit and nut trees, and interior plantscapes.

Active Ingredient: Imidacloprid, 1-[(6-Chloro-3-pyridinyl0methyl]-N-nitro-2-imidazolidinimine (EPA Reg. No.: 432-1318), 75%.

EXTOXNET fact sheet: http://extoxnet.orst.edu/pips/imidaclo.htm

- Imidacloprid, a chemical with systemic properties and low mammalian toxicity.
- Imidcloprid is stable to breakdown by water to slightly acidic to neutral pH. This rate is increased exponential when exposed to light.
- Imidcloprid shows no evidence of causing cancer in long-term studies using laboratory animals.
- The U.S. EPA has given imidicloprid a Class E cancer rating (evidence of non-carcinogenicity in humans)based on its inability to cause cancer in lab animal studies.

Controls/Precautions:

In addition to worker controls/precautions such as proper PPE, there are several other controls in place for herbicide and pesticide use/application to protect the environment. All pesticide/herbicide applicators must be licensed, as mandated by the Department of Agriculture Structural Pest Control Board. Applicators are trained on the proper mixing and application of herbicides and pesticides. Some control measures the applicators use include not spraying within 10 feet of waterways and not spraying if the wind speed it greater than 5-10 mph. A control measure used while mixing is not filling the tank more than half full to prevent spillage. In addition, tanks are equipped with screw cap and hinged lids.

The majority of herbicide spraying occurs during the day on the west side of the site where the bulk of the landscaping exists. Some eastern locations are sprayed, however, including parking lot J and the rock area near the north guard shack. Given these controls and the relatively low quantities of herbicides/insecticides used, the environmental and community risk is low.