

# MINE SITE ENVIRONMENTAL MONITORING



## APPLICATION BACKGROUND

Planning, operating and decommissioning mine sites require detailed long term environmental monitoring and evaluation.

Generally a new mine will not be approved without a detailed environmental monitoring plan, which would be approved by government authorities with an overall objective being that the environment is not changed in any way as a result of the mining operations. As mines may operate for several years, there would be a need to monitor the different stages.

Firstly there will be the need to monitor environmental parameters before any operations commence to determine a baseline for the

local environment. Secondly, when the mine is operating, there will be environmental parameter limits which must not be exceeded during the operations. These parameters need to be monitored and recorded. Furthermore, alarms for out of limits conditions should be set up and out of limits occurrences recorder and analysed.

Finally, when the mining operations have been completed, there is a need to rehabilitate the mine site and restore the mine area to it's original condition.

It is important to monitor the mine site for a period of years to make sure that the site is recovering as predicted.

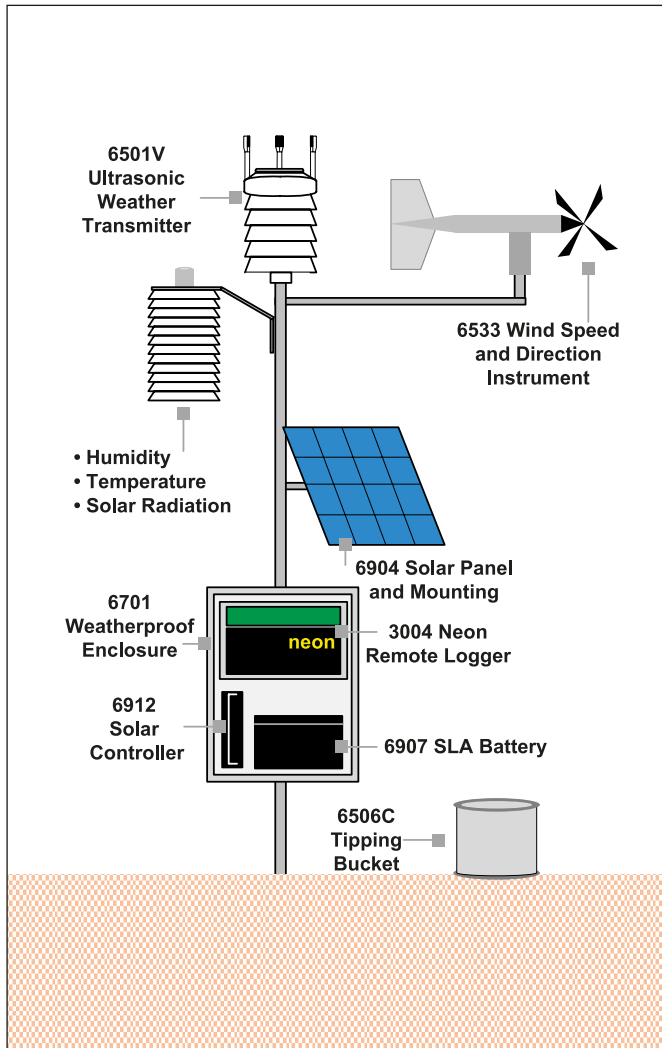
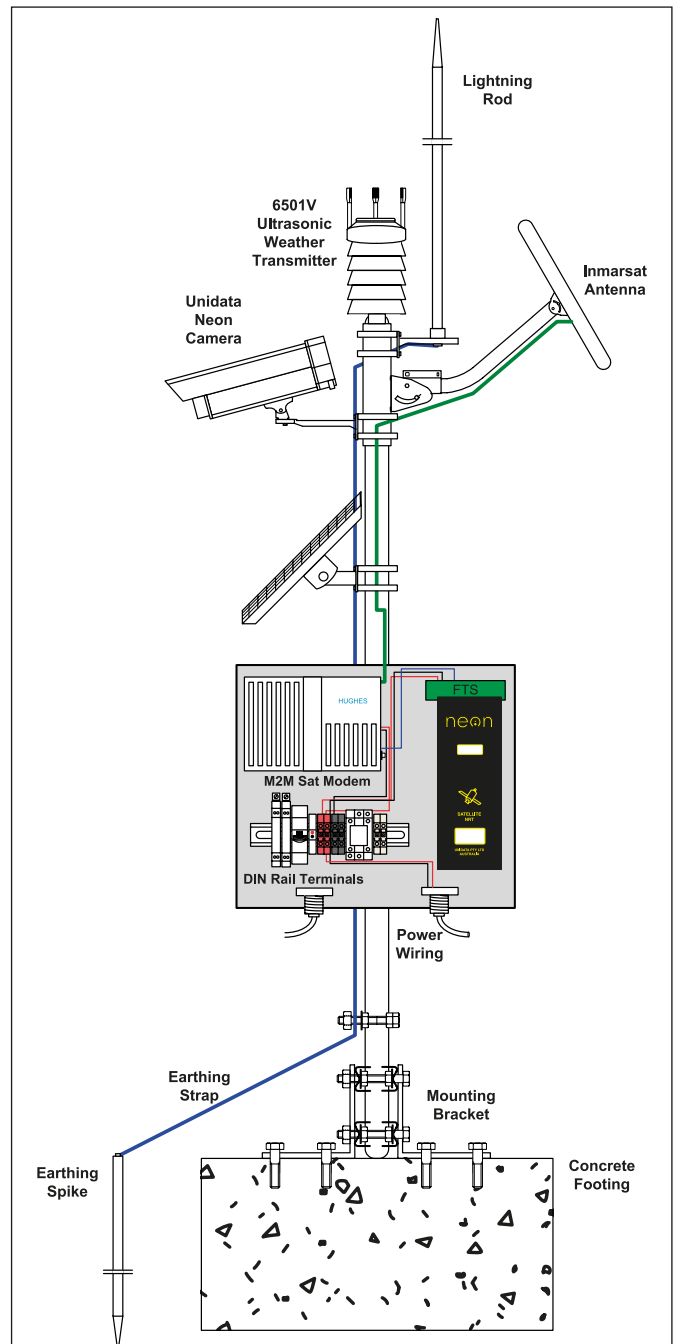
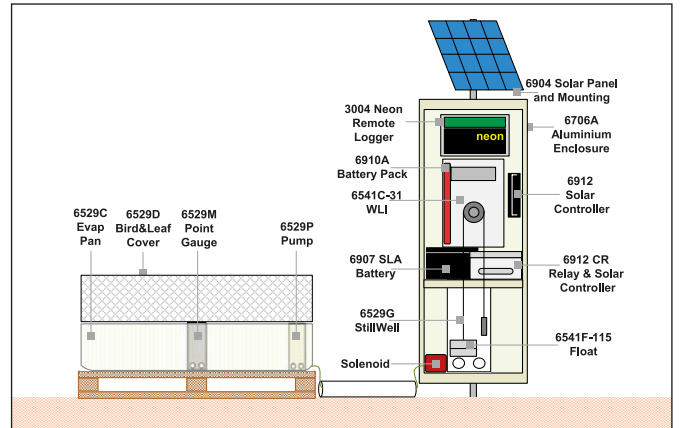
## APPLICATION DETAIL

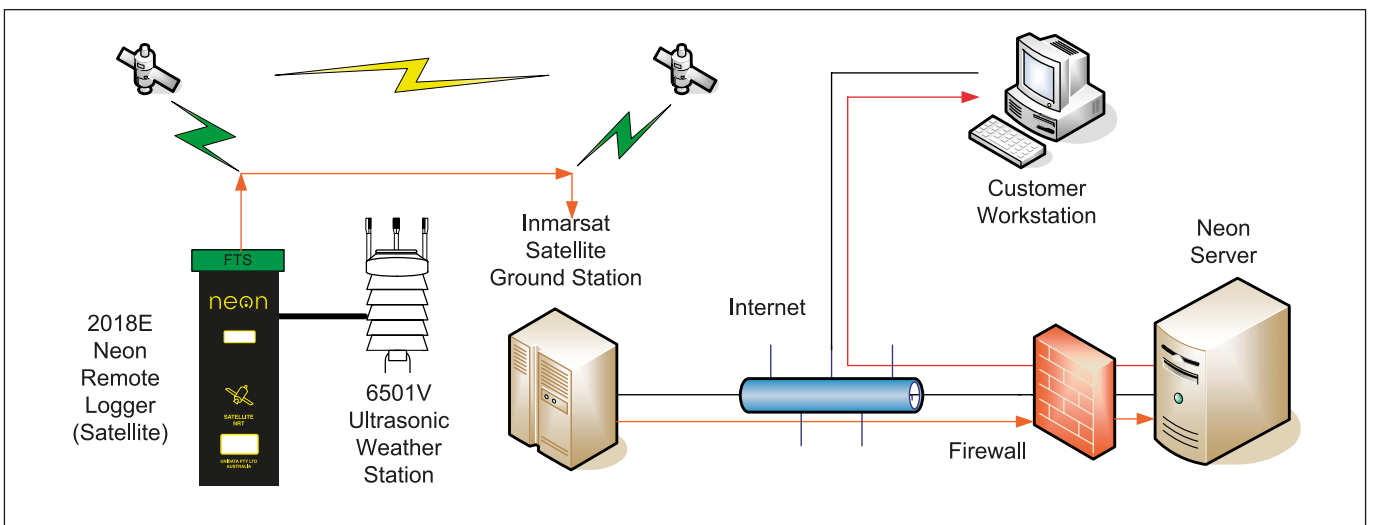
Mostly, there will be a requirement to monitor the weather in the area. For example, weather station tier 2 can be used to record the ambient conditions, like wind speed and direction, humidity and temperature and solar radiation. Collected data helps establish general wind conditions around the mine. This analysis then assists in creating processes that should prevent mine emissions to be carried, by the wind, to areas of population, such as a local town or city.

To get good readings for the local area, there may be the need for multiple weather stations to be installed, for instance, one at the plant and one at each perimeter fence of the facility.

Unidata supplies various weather station instruments, either a multifunction ultrasonic weather transmitter, which is very convenient to install, or a separate discrete weather instruments. For this application, the multifunction ultrasonic weather transmitter would be the best choice.

As well as weather, there may be a need to monitor evaporation, especially important in uranium mines. All Unidata's evaporation systems measure how much water evaporates from a US Class A evaporation pan by measuring the water level in an adjoining still well.





The simplest model, known as the 6529-1 Evaporation Monitoring System, comprises of an evaporation pan with a bird and leaf cover and a manual measurement system.

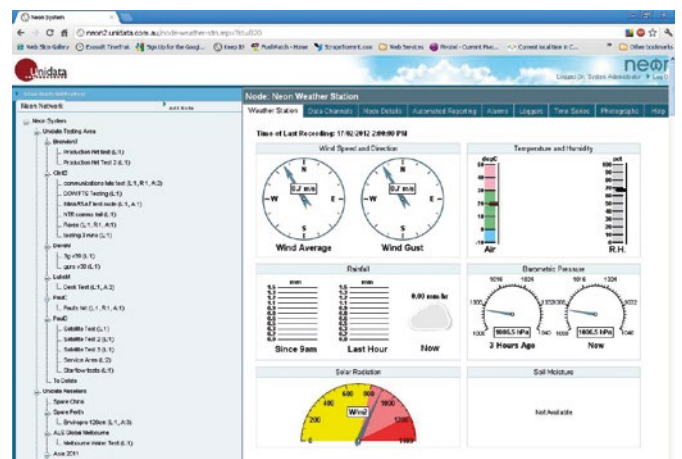
Furthermore, there may be a requirement to add additional instruments to measure the presence of noxious gases and dust. There are many manufacturers of gas monitoring equipment. One such manufacturer is Draeger that offers sensors that measure noxious gases such as CO, CO<sub>2</sub>, NO, H<sub>2</sub>S, SO<sub>2</sub> as well as O<sub>2</sub> and N. These instruments typically provide a 4-20mA analog or a Modbus output which can be read by Neon Remote Logger routinely, perhaps every minute and then routinely send the data to the Neon Server every 15 minutes.

Monitoring of the water table (Groundwater) in the area will also be needed. Groundwater depth (often called bore hole monitoring) is measured with a small diameter sensor deep in an observation bore hole. Water depth can be measured with a pressure sensor lowered down the bore hole and immersed in the water. This is called hydrostatic depth method. Alternatively a standard float-and-pulley sensor system with a small float and a pulley at the top of the bore hole can also be used to measure depth. These systems are typically installed in existing bores, perhaps with a diameter of 100 to 200mm and a depth of 5 to 50 meters.

Water quality measurements for any local streams or mine site process outflows is important. To comply with environmental protection laws, water quality monitoring instruments should be used for regular water quality audits of any outflows.

These instruments can also be connected with a Neon Remote Logger to scan the instruments inputs, perhaps every few seconds and immediately alert a central Neon Server if there are any out of limits conditions. Logger can send routine data to the Neon Server, utilising either cell phone, satellite or plant Ethernet or WiFi network.

Finally, all of the environmental measurements would be recorded on the central Neon Server system, which is web based, so the data can be accessed from anywhere on the internet. The data could also be exported, via several methods, perhaps each minute, or each hour, or each day to any central environmental monitoring compliance system as required.



## TYPICAL CONFIGURATION

## APPLICATION SPECIFIC INSTRUMENTS/INPUTS

Options	Unidata Part Number	Description
WXT536 measures barometric pressure, humidity, precipitation, temperature, wind speed & direction	6501V-H	Vaisala Weather Transmitter RS232/422/485 SDI-12
Evaporation Recording System Automatic	6529-3	Automatic Evaporation Recording System
Dräger Gas detection Instrument	Dräger MiniWarn	CO <sub>2</sub> / CO Gas Monitor
Water Electroconductivity Instrument	6536E	Water EC Instrument with Batt, 512K CMOS memory
Four Electrode water Conductivity Probe	6536P-2-10/20/30/50	4EL Water Conductivity Probe - 10m, 20m, 30m or 50m
Hydrostatic Water Depth Probes	6542D-A/B/C	PT12 Pressure / Temperature Sensor SDI-12 3.5m, 10m or 20m
Hydrostatic Water Depth Probes Titanium	6542D-T-A/B/C	PT12 Pressure / Temperature Sensor SDI-12 3.5m, 10m or 20m
4-20mA Pressure Transmitter	6548A-B/C	Submersible Pressure Transmitter 4-20mA 5m or 10m

## NEON TELEMETRY - NRL / RTU / FIELD UNITS

Options	Unidata Part Number	Description
Ethernet	3016A-000 / 3008A-000	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G/4G	3016A-C00 / 3008A-C00	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G/4G and LoRa	3016A-CL0 / 3008A-CL0	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite-Inmarsat	3016A-00I / 3008A-00I	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite-Inmarsat & 3G/4G	3016A-C0I / 3008A-C0I	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Low Earth Orbit Satellite - Globalstar	3016A-00G / 3008A-00G	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Satellite - Iridium Short Burst Data	3016A-00R / 3008A-00R	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Standalone RTU/NRL - Industrial	3004A-00 / 3004A-0L	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
Cellular RTU/NRL 3G/4G - Industrial	3004AC0 / 3004A-CL	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
M – Series Standalone RTU/NRL	3004A-M000 / 3004A-M0B0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Cellular RTU/NRL 3G/4G	3004A-MC00 / 3004A-MCB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series LoRa RTU/NRL	3004A-ML00 / 3004A-MLB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Ethernet RTU/NRL	3004A-MEBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional
M – Series Microsatellite RTU/NRL	3004A-MHBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional
M – Series Iridium Short Burst Data RTU/NRL	3004A-MIBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional

## NEON APPLICATION SOFTWARE - CUSTOMER SERVER

Options	Unidata Part Number	Description
Neon Applications Software	2302A	Neon Server Software Licence Incl 5 NAL
Neon Applications Software	2302A-10	Additional 10 NRT Access Licence
Neon Applications Software	2302A-20	Additional 20 NRT Access Licence
Neon Applications Software	2302A-50	Additional 50 NRT Access Licence

## NEON HOSTING SERVICE - UNIDATA SERVER

Options	Unidata Part Number	Description
Neon Hosting Service	2301A	Neon Data Initial Subscription Setup Fee
Neon Hosting Service	2301A-01	Neon Data Service Fee for 1-50 NRT
Neon Hosting Service	2301A-02	Neon Data Service Fee for 51-100 NRT
Neon Hosting Service	2301A-10	Neon Data Service Fee Metering

## DATALOGGER MANAGEMENT SOFTWARE

Options	Unidata Part Number	Description
Starlog V4 Management Software	6308A-AUE	STARLOG V4 Full Licence Key

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