MIRION Connect 21

Annual Users' Conference

Telemetry / Area Monitoring

Perry White

Product Line Manager / Application Support

Mirion Connect | Annual Users' Conference 2021
Aurora, Colorado

Introduction

- We have done variations of this course for quite a number of years. It makes it difficult to make it “Fresh” each time.
- This year it is more difficult since this breakout overlaps a number of other breakout sessions or Training sessions. Orion and the RDS breakout yesterday and the EP breakout session after this one.
- So please be bear with me if some of the information is similar.

- Without further ado we will start with the AWM!

Adaptive Wireless Monitor
Next Generation AWM

- **I Wish!**
- We tried to get approval for a next generation version but it did not make it through the process.
- We are now looking at what can be done by modifying out existing AWM.
- Currently we are looking at all the customer feedback (Thanks to those that participated!) and trying to determine what we can do without starting over!

AWM Introduction

- ***Adaptive Wireless Monitor – the Backbone of our Telemetry!***

- All – in – One Remote Monitoring Solution
  - Base Station
  - Repeater
  - Allows connection to External Radio (Active Dive Antenna)
  - EXT – Can connect to most of our products and some of our con products.

- Touch Screen display for configuration
- Connect Locally to a Computer
- Connect via LAN or Wi-Fi
- Power via POE
- Battery Backup up to 24 hours
- GPS enabled

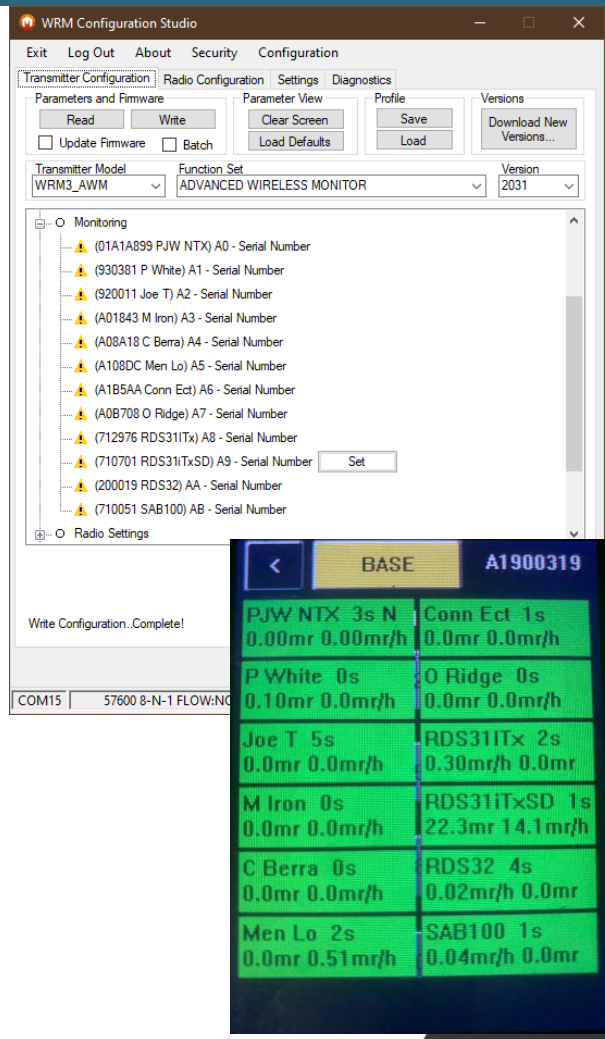
AWM Functions

Four basic functions:

- Base Station
  - Direct or scrolling data
  - LAN and Wi-Fi for telemetry software
- Repeater Mode
  - Standard Operability as legacy WRM2 Repeater
  - GPS enabled – Repeat GPS Coordinates associated with instruments assigned to AWM
- External WRM Receiver Use
  - When selected, Can be used a Dive Repeater or a Dive Base Station as well as other applications.
- External Transmitter
  - Simpler setup – e.g. setup for an AMP or AMS-4 is performed via touch screen (no longer required to load a configuration)
  - AMS-4 data transmission improved
  - Large array of devices – ABPMs, ASM-1000, iCAM, Overhoff Tritium monitor, Quest Temp monitor, O2 Monitor and the Bionix Tritium Monitor.
  - Higher cost – so need to cost justify what intended use is if strictly purchased for an EXT

AWM Applications

- Dual Threat:
  - An AWM can be used as a primary monitoring where coverage is limited (Crash Cart in a box!)
  - Backup for Critical Activities (S/G Bowl Work)
- Direct Coverage Methods (requires the dosimeters to be logged into the AWM with WRM Config Studio)
  - Base Station or normal Repeater – in range of the personnel that are being covered
  - Diving Repeater – connect an Active Dive Antenna directly to the AWM (antenna – set to external 1



AWM Applications

- AWM – Active Dive Antenna (Upgrade 2022 Higher Power)
  - Cheaper
  - Multifunctional
  - Allows for local monitoring (backup)
  - Data flooding Issue resolved
  - Can Test Operability Before Use by changing channel on a base station and the AWM internal radio.
- Many sites are Currently Utilizing DMC3000
  - No Wires or bulky iMUX
  - Enhanced Alarms
  - Less parts
  - Utilize Cell Phone Waterproof Bags1

AWM Applications

Emergency Planning / Response

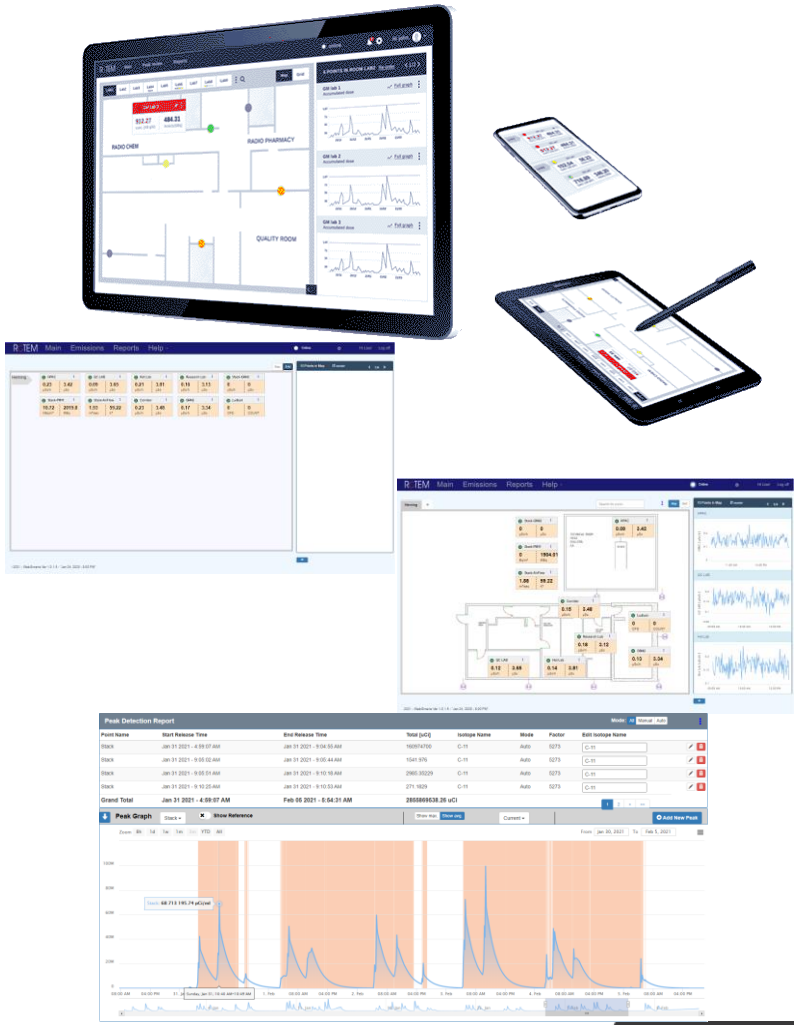
- Since we go over this in the EP breakout session I won't say much here.
- If you have or can create WRM2 coverage outside of your buildings (which is easy), you can utilize the AWM to provide GPS coordinates to the instruments you are using (that have telemetry capability).
- Basically, just log them into the AWM and set the AWM to repeater mode and it will repeat the information from your instruments and dosimetry to your telemetry software.
- This is assuming the vehicle you are in is within range of your outside coverage

Software Introduction

- Televiewer 3000:
  - This is our primary Full Function Telemetry software. It is used for Monitoring personnel and monitors (Radiation, Airborne, Temperature, Gas, etc.).
  - It is Not used for interaction with what it is monitoring! No two way communication.
- Telemetry Studio:
  - I mention this because it is the Free software we now provide. It can be installed with DMC user.
  - It is used for DMC-3000s only with no alarms and minimal features.
- Orion:
  - This has both full function telemetry capability with the additional of adding location information to all the monitors.
  - The location tracking capability allows function such as heat mapping of radiological and other information as well as automated exclusion zones based on the data and location.
- Horizon:
  - It doesn't interface with out WRM2 Telemetry but I included it because it does provides two way communications with the equipment it monitors and it utilized at a number of sites. It is limited
- WebiSmarts:
  - This is new for us and we have it for the first time at this meeting. It was designed for Stack monitoring and area monitoring.

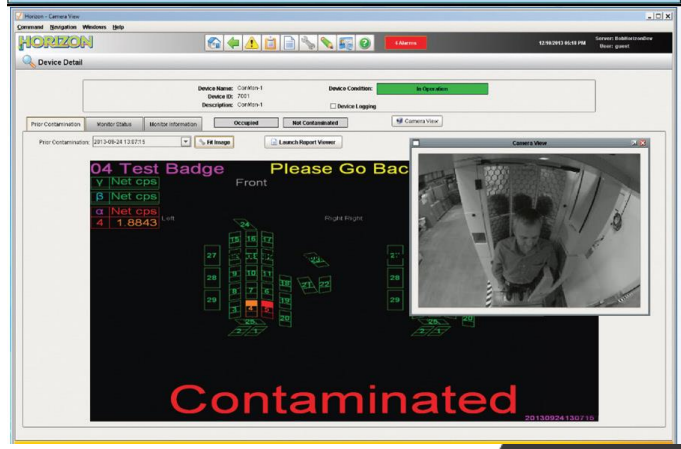
Software
WebiSmarts

- WebiSmarts
  - This also is a separate breakout session, coming up so be sure to attend if interested!
  - This is also a web-based client software and can provide monitoring in both a Map and Grid format. It also can show up to 5 graphs at the same time.
  - It was designed for Stack Monitoring and Area monitoring not for personnel.
  - It can use WRM2 data so can see a number of area monitors.
  - Because it is used for stack monitoring the emissions reports shows when the releases occurred and how much activity went out the stack.



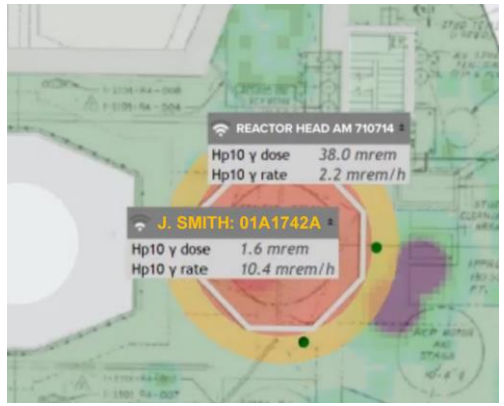
Software
Horizon

- Horizon
  - There is a separate class for this so we will just touch on this software.
  - This is more Supervisory software designed for monitoring instrumentation not personnel.
  - It is web-based and can be used to monitor up to 200 Monitors:
    - EcoGamma Area Monitors
    - iCAM Airborne Monitor
    - G64 Area Monitor
    - Argos Contamination Monitor
    - Sirius Hand and Foot Monitor
    - Gem-5 Gamma Exit Monitor
    - Cronos Tool Monitor
  - Two way communication is a great benefit, but it also has a lot of report functionality including trending alarms etc..
  - It also provide a whole lot of data from the individual monitor views.



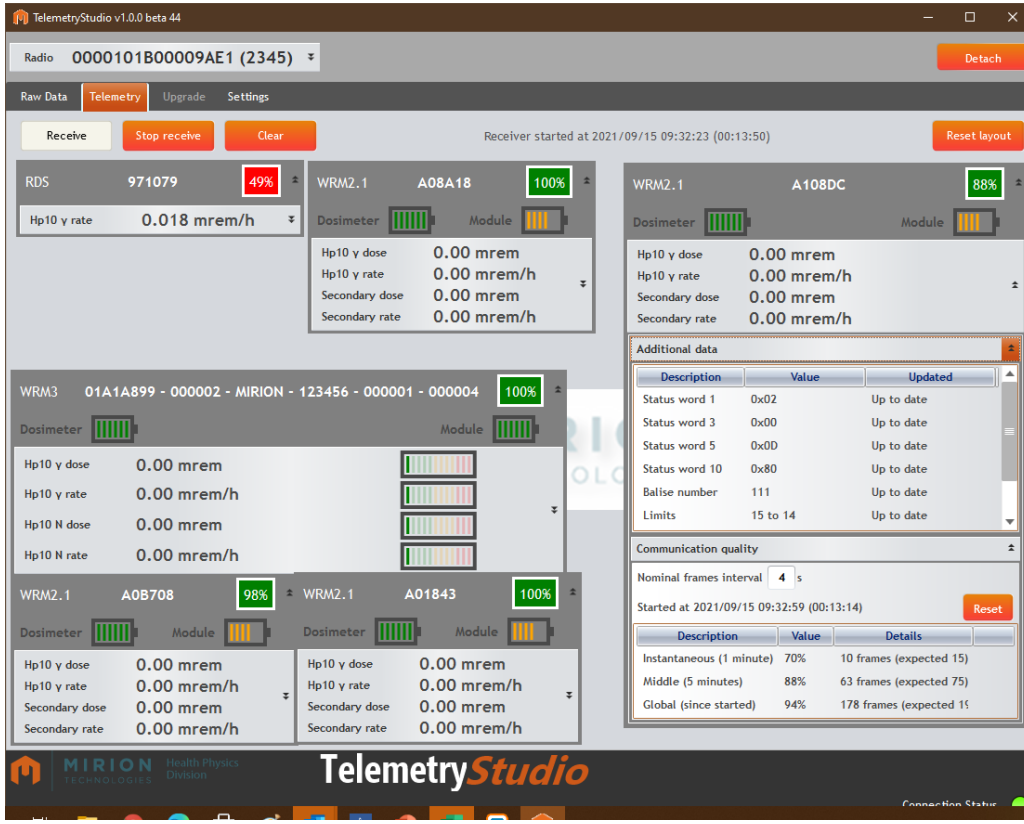
Software
Orion

- Orion:
  - This is also a separate Breakout so we are just going to touch on a few things.
  - First it has its own Telemetry Suite which may eventually be its own stand-alone product.
  - It uses the same parsers as Teleview so can monitor all the same equipment.
  - Geofence Warning areas can be manually created or automatically created based on criteria from monitors (dose rate, Airborne, Temperature, O2 levels, etc.).
  - We can also do heat maps based on our dosimeters. Most of the area in the pictures to the right shows green except when someone got close to the reactor head you see the increase rate in purple.
  - While initially we are using just our LTx module and asset tags associated with other monitors, we will be able to add to other instruments directly to be able to perform additional functions. An example of this is the new IC3 Ion Chamber.
    - Some sites still insist on using Ion Chamber dose rates. Imagine doing General Area surveys without having to write anything down? Just walking around looking for higher dose rates.
    - This really opens the door to a Lot of Possibilities!



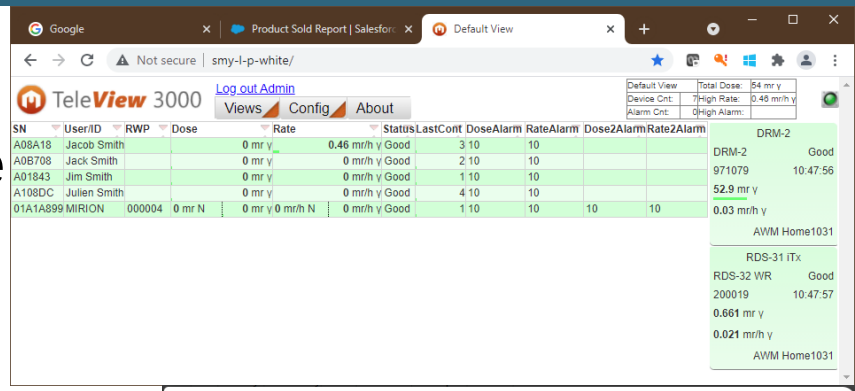
Software
Telemetry Studio

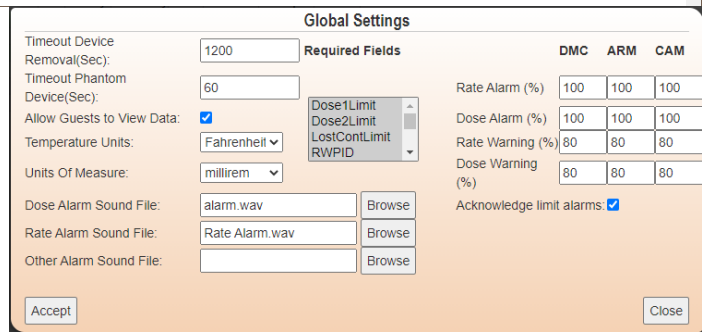
- Telemetry Studio:
  - Basic information, but you can expand to see more information like Name, RWP etc., but only if using WRM3 data.
  - No Software alarms but does display device alarms.
  - As mention it does display some Area Monitor data. Mine only displays Single Packet protocol but I think it will be expanded to Dual Packet. Nothing else.
  - Good for a small system monitoring just a few people or area monitors.
  - Also useful as diagnostic to see if you are getting data when your primary telemetry is having problems.

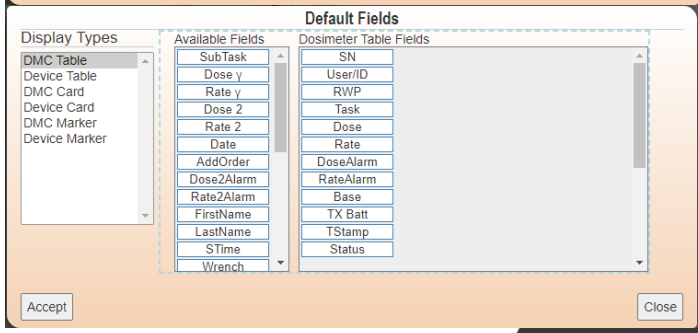


Software
Teleview 3000

- Teleview 3000:
  - TeleView 3000 is a web based remote monitoring software with the Client accessed via the web browser.
  - It is our Primary Telemetry software so we will spend some additional time on its uses and features.
  - Teleview can monitor almost all our monitors and some competitors except:
    - It doesn't monitor the Argos, Gem, Sirius or Cronos line.
    - It can monitor a G64 but only if connected to an iCAM.
  - It provides a wide variety of monitoring options and settings:
    - Global Settings allows you to set your different units, Software Alarms and Warnings, the ability to Acknowledge alarms and chose sounds.
    - Default Fields allows you to set what fields are initially seen by the user.
    - These can also e modified for each individual for each view under Data View and selecting Define View Fields.

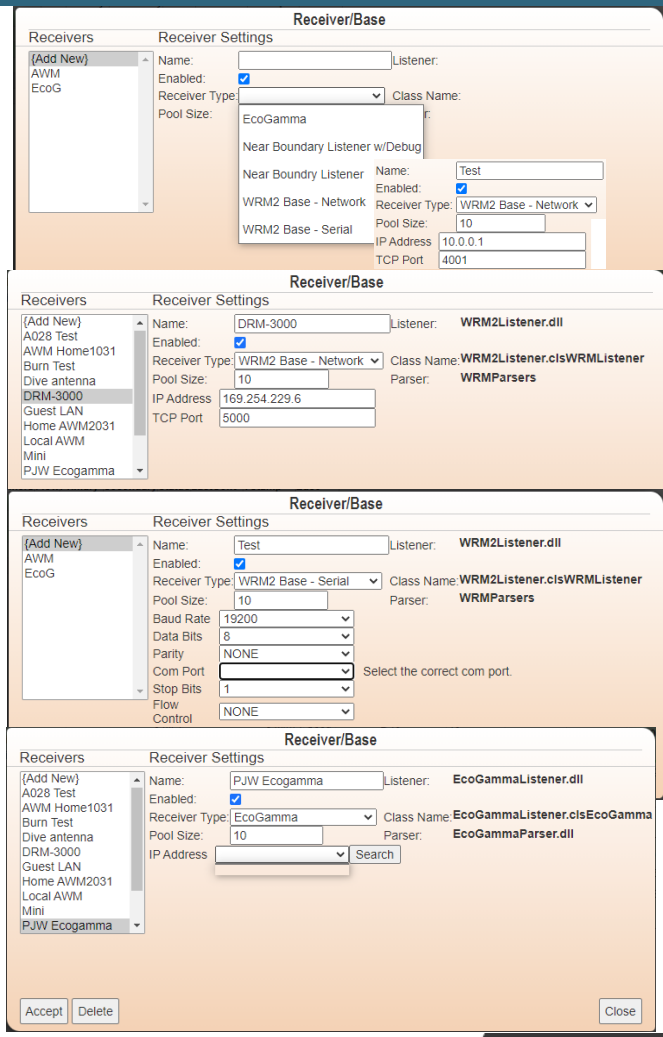






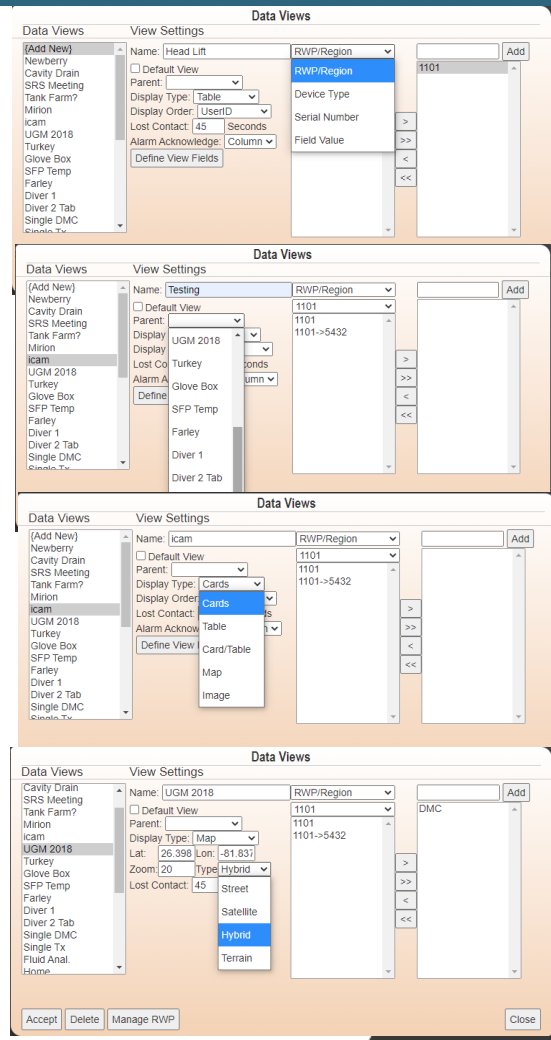
Software
Teleview 3000

- Receiver Bases:
  - This is where you make you connection to your devices!
  - If adding via network, select WRM2 Base - Network
    - This may also be a DRM or an RDS on the Network.
  - Create a Name, Check Enabled, Enter IP Address, Leave Pool size as 10
  - The TCP Port is 4001 for an older Base Station or AWM and 5000 for the DRM.
  - If adding as standalone, select WRM2 Base - Serial
  - Create a Name, Check Enabled and Set Baud Rate only (Old Style Base –19200 / AWM –57600)
  - Select Com Port (maybe verified in Device Manager)
  - If adding an EcoGamma Select EcoGamma (Teleview 1.2.9 and up)
  - Create a Name, Check Enabled, Enter IP Address Manually or Search if you don't know it, Leave Pool size as 10

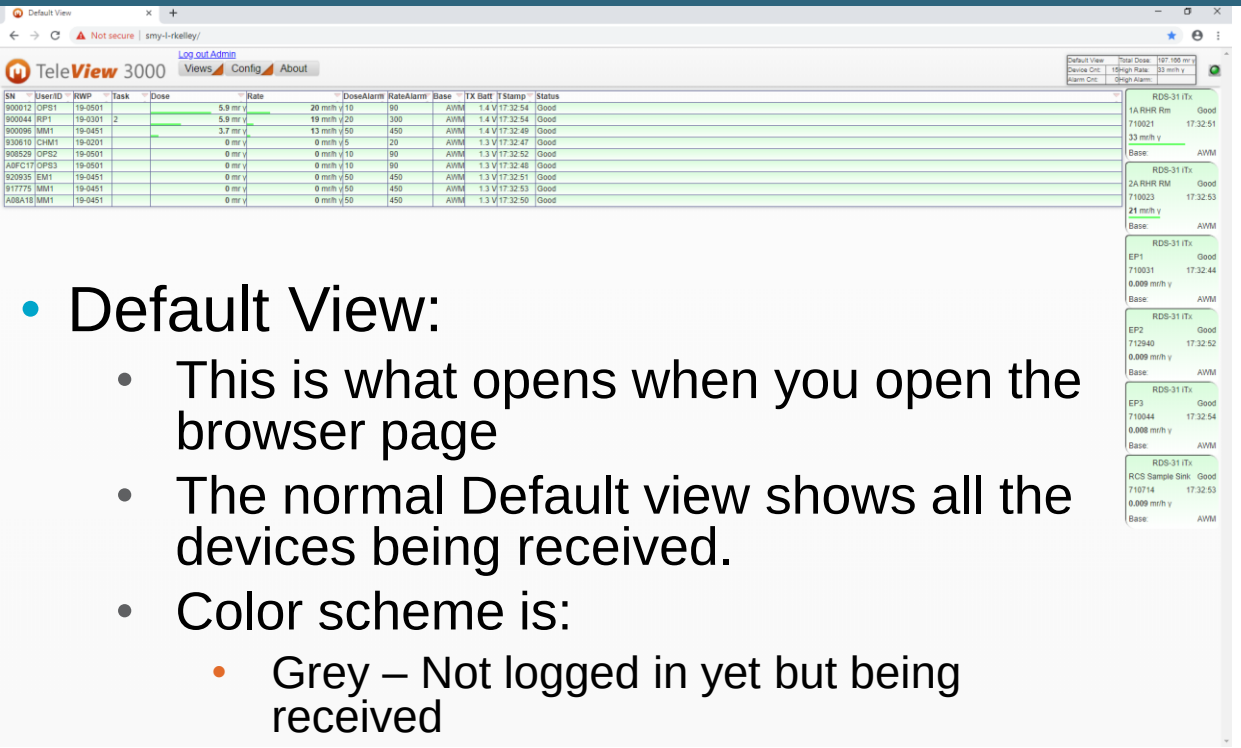


Software
Teleview 3000

- Data Views:
  - This is where you setup what data you want to see for a specific View and how you want to see it.
  - For Instance you want to see a specific Job (Head Lift) based on the RWP used (RWP 1101). You use the RWP as a Filter.
  - You can also filter on the location, type of device, the serial number or any Value in Any Column!
  - You can create a View under another view or parent view, such as U-1, or Aux Bldg etc., so your lists don't get too large.
  - You have a selection on how you want to view it, either as a Table, Cards, Card/Table combo (DMCs in Table everything else as cards), Map (Google Maps) or Image (any type of picture).
  - If you do select a Map View you do need to enter the GPS coordinates for the center of the map and select a zoom level to start at. You also have to chose the type of map to use. I like Hybrid to see the roads with the Satellite images.



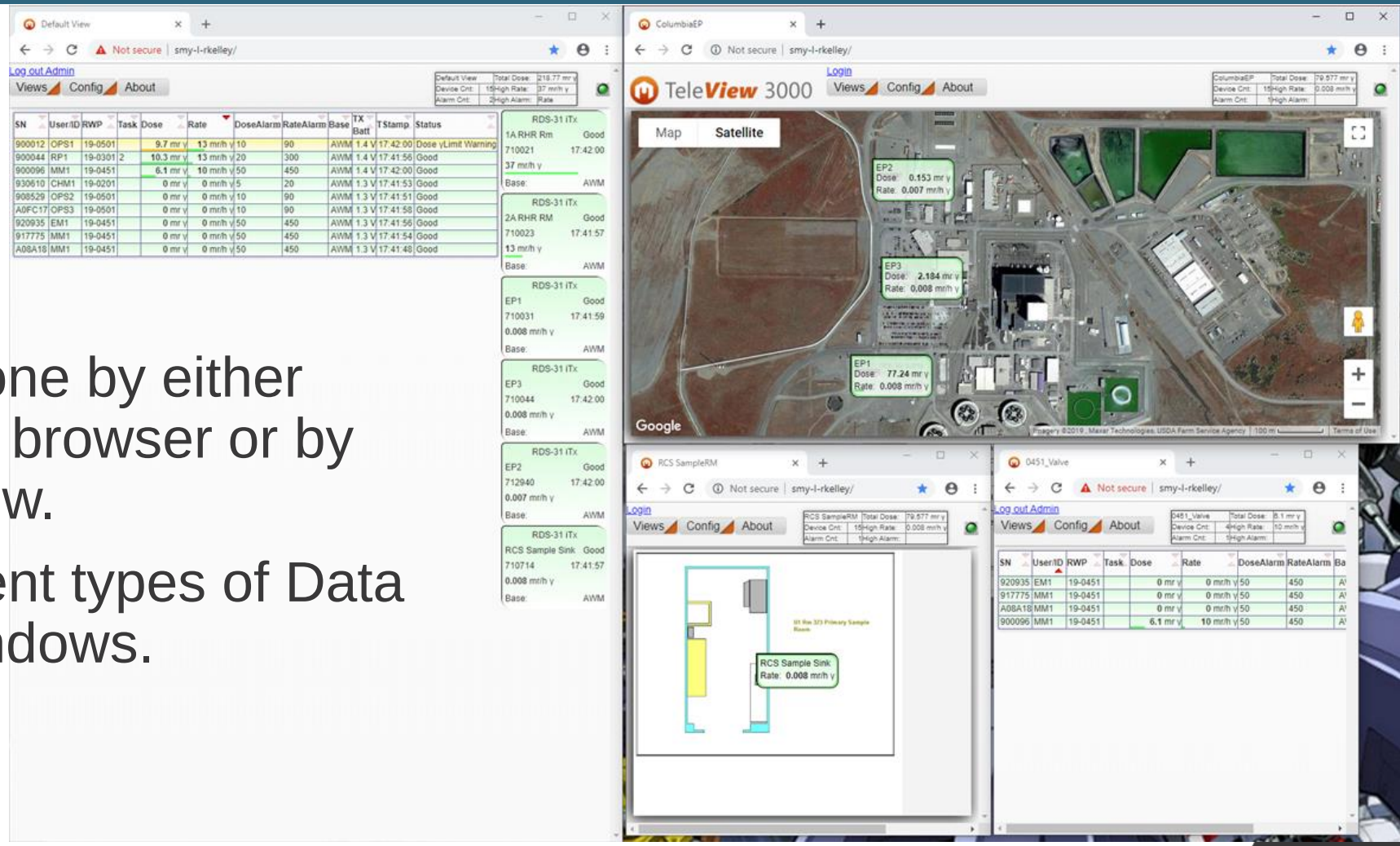
Software
Teleview 3000



- Default View:
  - This is what opens when you open the browser page
  - The normal Default view shows all the devices being received.
  - Color scheme is:
    - Grey – Not logged in yet but being received
    - Green – Logged in
    - Yellow – Reached software Warning limit
    - Red – Alarm either Hardware of Software.

- Map View:
  - Devices can be placed on the map several ways.
    - Enter the GPS coordinated of the specific device.
    - Pin the device to the map by right click at the locations.
    - Associate the device with an AWM being received with GPS Coordinates.

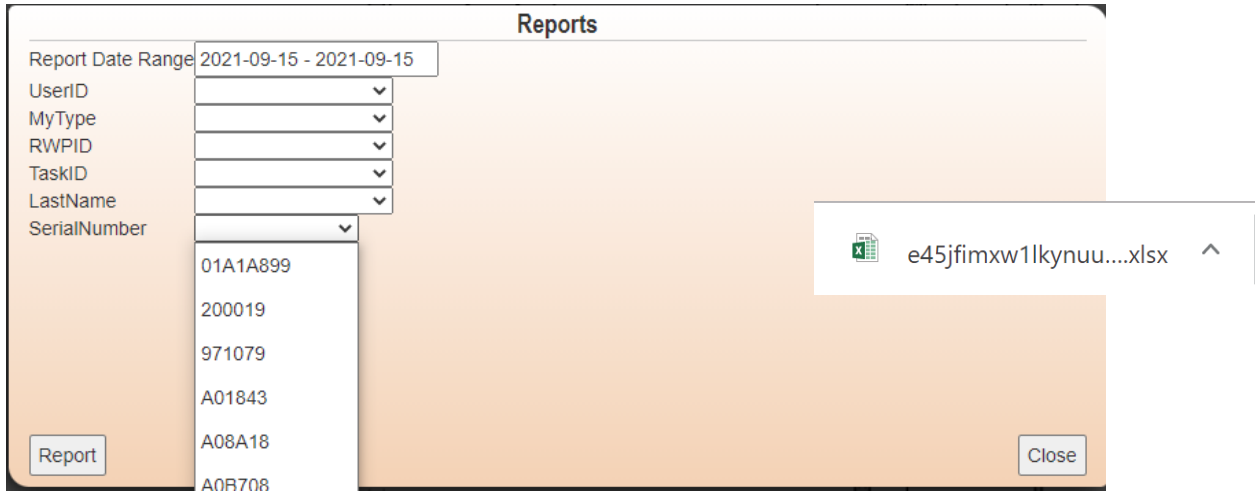
Software
Teleview 3000

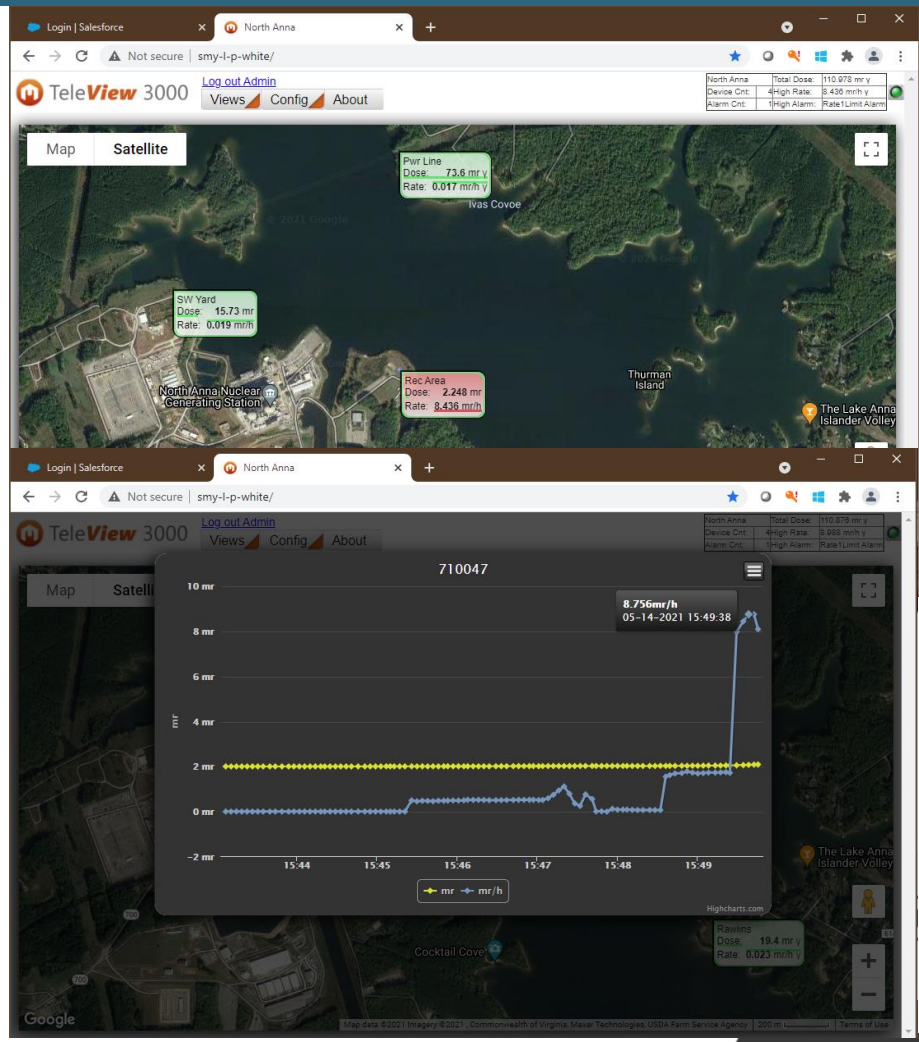


- Multiple views can be done by either adding a new tab on the browser or by opening up a new window.
- You can set up all different types of Data View on the different windows.

Software
Teleview 3000

- Teleview also provide trending data just by right clicking the device and selecting Trending for the last 100 points.
- More detailed information can be done with the Reports section based on a date range, and a selection of other criteria but typically serial number is used the most.
- It then download the data in a spread sheet file.





Area Monitoring Selection

- Every site is different and has unique challenges. Below are some questions to answer to determine the best fit for the monitor.
  - Is House Power available?
  - Are Network connection and POE availability?
  - Battery Power required? If so how long?
  - Does the area have WRM2 coverage already?
  - What are the Dose rates to be monitored? Highest and Average?
  - Exposure needed (what's the average dose rate and monitoring time require?)
  - What type of dose rates (Beta, Gamma, Neutron)?
  - Will this be Temporary or Permanent?
  - Does is require a special Qualification (this presentation does not include RMS install plant monitors).
  - What Alarm capabilities are required locally or remotely?
  - What Display capabilities are required?
  - Are Relays or other outputs required?
  - Are Remote Probes required (can you physically place the monitors where you need them?)
  - Will these be Perimeter Monitors? What infrastructure do you have outside?
  - Solar required? How many hours of light, how much time without sun?
  - What is the budget – This really should be the first question because almost all other considerations can be solved with money!

Area Monitoring Selection

- I used to hand out an Area Monitor selection guide. It got a little unwieldy to keep up but it did give an example of the cost. Here is part of it just to give you an idea:

Device	Options Included	Local Alarm	Water Proof	Battery Pack	Battery Life	A/C Option	Cost	Comments
DMC-3K AM	AM Option	Yes	Yes	Yes	4 Mon	No	$1275	No Power Save Option, Can Power DMC through Transmitter with mod.
DMC-3k A/C Powered	Powr Bank and Cable	Yes	No	Yes	Indefinite	Yes	1325	Power bank is recommended in line, as the DMC Must be turned off and on to reconnect if loss of power occurs.
RDS-32iTx	See List	Yes	Yes	No	~2 Wk	Yes	1500	GM Tube to 10rem/hr. Up to 4 Weeks if using Lithium Batteries
RDS-31iTx WR	See List	Yes	Yes	No	~2 Wk	Yes	$1900	GM Tube and SD Detector up to 1000 rem/hr. Up to 4 Weeks if using Lithium Batteries
RDS-32iTx SD	See List	Yes	Yes	No	~2 Weeks	Yes	$1750	SD Detector Only Up to 1000 re,/hr, poor low dose rates. Up to 4 Weeks if using Lithium Batteries
RDS-32 Options	Long Term Bat.Option	Yes	No	Yes	Up to 2 Years	No	+$671	Long term battery for inside and perimeter monitoring. External probe Optional. New Alarm feature added.
	Med Term Bat Option	Yes	Yes	Yes	~45 days	No	+$300	In water proof case with Carabiner to easily Hang up. No remote probe use without drilling hole in case.
	Power Cradle	Yes	No	No	Indefinite	Yes & USB	+$206	¼" x 20 insert to allow easy mounting to almost any location! External Probe optional.
	Alarm Box and LIght	Yes	No	No	Indefinite	Yes	+$1800	Big Alarm tower and Siren. Optional Network Card and a remote alarm tower. External probe optional
	GMP-12 GSD	Na	IP67	Na	Na	Na	$1500	
	GMP-12 SD/UW	Na	IP67 / IP68	Na	Na	Na	$1200	

Area Monitoring Selection

- Power – Hard to come by in a Power Plant!
- Obviously if you have house power that is the best scenario. If not there are a few other options which all rely on WRM2 telemetry:
- Battery Power – Using the DMC-3000 as an area monitor or the RDS-31/32 (from this point just RDS) are the best options for this.
  - DMC-3000 Area monitor has a Tx module, a battery adapter in a Pelican case and can run for up to 4 months on 2 D cell batteries.
  - The RDS has a similar area monitor configuration and can run around 45 days with 4 second transmission.
  - The RDS just with 2 AA lithium batteries does well at 3 weeks at 4 second Tx up to 6 weeks at 60 second Tx interval.
  - The Long Term Battery box for the RDS can last over a year If configured correction with 30 second transmission. It also has an external Alarm and Siren and you can connect an external probe (CSW Probes only at this time).

Area Monitoring Selection

- Power – POE! This is useful for a number of telemetry devices:
  - The AWM can use POE power in any mode.
  - The EcoGamma normal requires a network connection so POE it is normal power.
  - The DRM-3000 uses POE to power it and can also communication through the network connection as well as WRM2.
  - The RDS can use POE for power by using a 5V power adapter and the Power Cradle option but uses WRM2 to communicate.
  - The AC powered RDS Alarm box has a Network adapter option but it is Not POE.

Area Monitoring Selection

- Dose Rates and absorbed Dose Life:
  - There are too many possibilities with all the different equipment we have to provide the information on all but it is a big consideration.
  - In general monitors with memory and processing capabilities won't last as long. The RDS iTx SD meter was lightly hardened and designed to last to 20k rem total dose. The similar detector in the GMP-12SD/UW will last 90k rem.
  - Wide range devices can burn up fairly quickly if the Low Range tube is active (~1k rem) so don't confuse wide range to high absorbed dose life.
  - The longest life device we have is the remote Ion Chamber probe for the G64 as there is nothing to burn out.

Area Monitoring Selection

- Types of Dose Rates to be monitors:
  - By far the vast majority of our monitoring is for Gamma dose rates and that is the base of our monitors.
  - We can also monitor neutron dose rates with the addition of external probes.
    - For the RDS (SN-D-2 probe) – this is designated in Teleview.
    - For the DRM-3000. The Pricilla or Wendi probes. We don't have this designation in Teleview yet.
  - We can also monitor Contamination both alpha and beta at the same time with the SAB probes. These designations do show up in Teleview.
  - We can measure beta dose rate with the Telepole 2 Beta head, the DRM-3000 with the IC-10 ion chamber and the new IC3 Ion Chamber, but we can't distinguish it at this point on Teleview 3000.

Area Monitoring Selection

- Permanent Installations - Qualifications:
  - To permanently install a monitor may require considerable engineering evaluation. For sites that need that qualification they don't want to spend the money to qualify the equipment, so they purchase Qualified equipment to start with.
  - While this presentation does not really include our Installed Plant Monitors by our RMS division. These are typically NQA1 qualified which is a Nuclear Plant qualification. The whole system has to maintain that qualification.
  - As expected, this equipment is more expensive than normal monitors as is the installation required to install per the qualification.
  - We actually can connected to our RMS equipment with our AWM and put them on our Telemetry system. But, it would not be part of the qualified system.
  - The G64 is the only area monitor we may use that does have some qualifications that we will discuss later. It has a SIL1 rating.

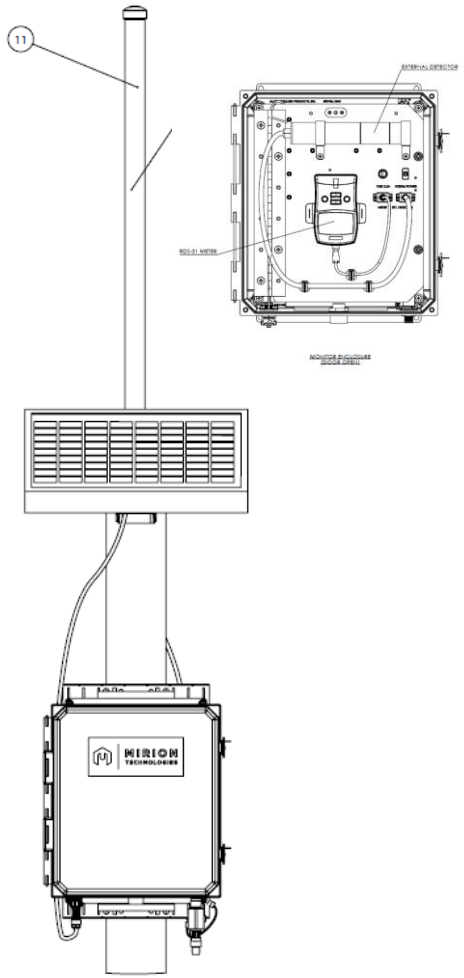
Area Monitoring Selection

- Alarms:
  - Being able to alert workers in the vicinity of the area monitor is many times a required feature. In addition sometimes a remote alarm is also required. We have a solution for that!
  - The RDS itself has a very loud audible alarm and has an LED alarm light as well so just by itself on in the Pelican case it is useful for notification.
  - Our Long Term RDS battery box has an external siren and light to add the additional capability since the RDS is now in a box.
  - The RDS Alarm box has a large alarm tower and a remote alarm tower option as well.
  - The DRM-3000 has an optional LED on top, and an optional Siren. Its screen also show an alarm as well as its internal speaker alarms.
  - The DRM-3000 also has an external alarm tower that can be remoted, and has a special alarm mount for most of its external detectors since they may be several hundred feet away.
  - The G64 also has a light tower and siren.

Area Monitoring Selection

- Remote Probes:
  - Devices that can add external probe can reduce the cost per channel of the monitor!
  - Using an external probe allows a Contact Reading as well as a General Area Reading.
  - Having a contact and general area reading is one way to verify operability with routine source checks.
  - Remote probes are smaller to fit in smaller spaces.
  - Remote probes can be waterproof to be used under water.
  - Remote probes can provide additional sensitivity or Range to the monitor.
  - Remote probes can see different types of radiation.

Area Monitoring Perimeters



- This is in the EP breakout in detail so will just mention it here.
- We have several different versions with a number of different capabilities.
- We also can power with Solar, Battery, AC and POE.
- We do WRM2 predominantly but can also get data direct from the network.
- A key to the WRM2 coverage is the repeater capability of the monitors.

Area Monitoring
DRM-3000 & Stack Monitoring

- This is in the WebiSmarts breakout so I won't go into a lot of detail but the DRM has a sibling called the DPU-3. It has the same functions but is in a white casing.
  - Supports 1 internal and 3 external detectors + 4ma - 20mA input (Flow meter)
  - Wide range of external probes
  - Displays up to 4 detectors simultaneously
  - Accumulate and Save Dose Rate & Dose – 1 month
  - Auto recognition of All Rotem, and other detectors
  - Large 7" TFT Graphic Display
  - IP-65, Durable Plastic Casing
  - Advanced communication: POE, TCP/IP, RS-485, Wi-Fi, WRM2,
  - Wall or Tabletop mounted
  - Optional Backup Battery (24 hours)
  - Optional Multi Color LED alarm light and Siren
  - Optional WebiSmarts monitoring software.

Area Monitoring
RDS-31/32 Alarm Box

- OK, the RDS-32 is waiting for the new firmware to use the Alarm Box but we will have it before the end of the year so I included it!
- It does have the external probe connection so you can connect any CSW or CSP probe to it!
- It has a network card option (Must be ordered with the alarm box)
- It has an optional external light tower also.
- Last it has a relay output to lock doors in case of alarm, etc..

Area Monitoring
G64

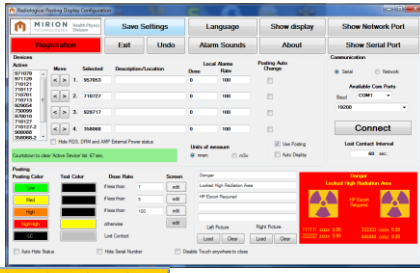
- I added this monitor because it can be connected to Horizon and it has some features the other do not.
- As mentioned it can only be connected to Teleview (or Orion) if connected to an iCAM as the background channel.
- It has a Safety Integrity Level 1 rating. None of our other (Non-RMS) area monitors have this. I do not know if that qualification extends to the Horizon software, but unlikely.
- It also has an Ion Chamber remote detector. It goes to 10,000 rem/hr but the main feature is Ion Chambers have the highest Absorbed Dose life possible.
- It also has Relay outputs as well as a Current Loop output and RS422 Pulse output.
- It does cost more but these qualifications may drive you to use it.

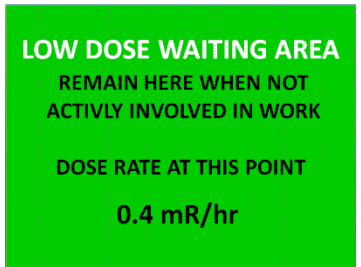
Area Monitoring
EcoGamma

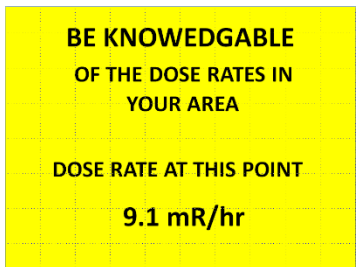
- The EcoGamma is interesting solution but was limited to use with Horizon. Now we can use Teleview for it, it adds additional value to the product.
- It is a clean unobtrusive solution, which is useful when placed in public areas.
- The Low Range GM is much larger than a typical LR tube so it add significant sensitivity to the monitor. This give you better information at environmental dose rate levels.
- No local displays or alarms (initially) and requires a network (POE) connection for power and communications.
- A display and Alarm tower were developed recently for a project at SRS. That option will soon be available.

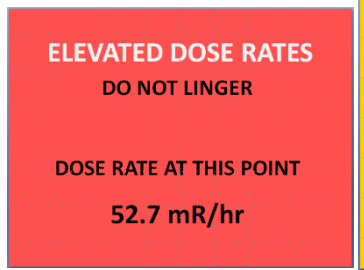
Area Monitoring
Radiological Posting Display (RPD)

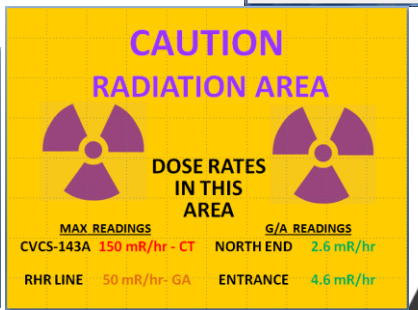
- The RPD is a dual function radiological information sign.
- This initial function was to display the dose and rate of up to 4 workers or area monitors which we kept.
- The new function was to provide a radiological information sign or Posting that was dynamic, changing based on the dose rate.
- It has an internal Mini Base Station inside to pick up any telemetry devices in the area (It can be outside a room to show dose rates inside).
  - NOTE we are discontinuing the internal RDS version.
- The software is easily configurable to select devices in range to customize the signage to display











Air Monitoring

- With the AWM we have a lot more options for monitoring Air!
- This include Tritium with our Bionix (and the rest of the ionix series)
- We now have the iCAM capability
- We have the ABPM or really any of the RMW DPU monitors.
- We can also monitor for O2 and other types of gases
- We can monitor Temperature and Humidity to determine the Wet Bulb Readings for Heat Stress.

What do you need?

- There are a lot of possibilities here so hopefully you may have seen something that will help your site.
- If not, this is your time to tell us what we are missing!
- We will start with the next slide of things we are currently looking at.

Will This Help?

- A couple things we are looking at now that are simple changes.
  - Update the AWM! Yes I'm still working on that.
  - Update the Active Dive Antenna to a Higher Power to get even better coverage with the use of an iMux!
  - Change the output connector on the Long Term Area monitor box to a Binder connection so you can use the CSP probes.
  - Create a simplified "Base" perimeter monitor to make outdoor monitoring easier to do and less expensive.

Questions?