

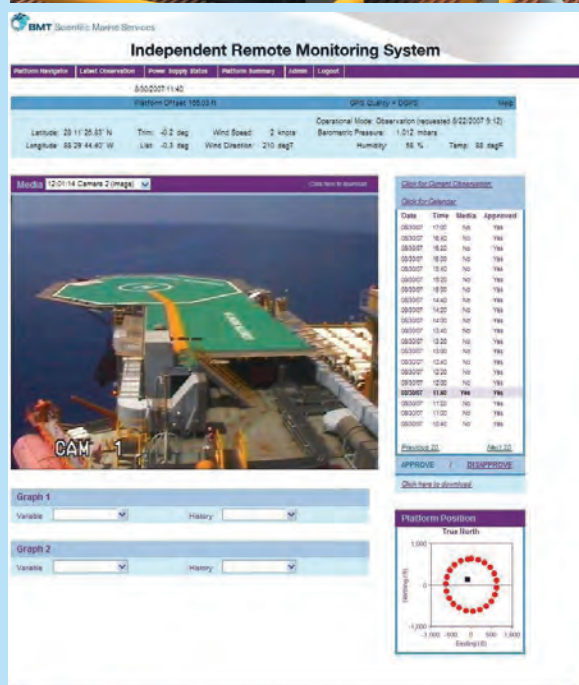
Independent Remote Monitoring

A new black box solution for remote monitoring and communication with offshore drilling rigs and production platforms via web based graphical user interface.

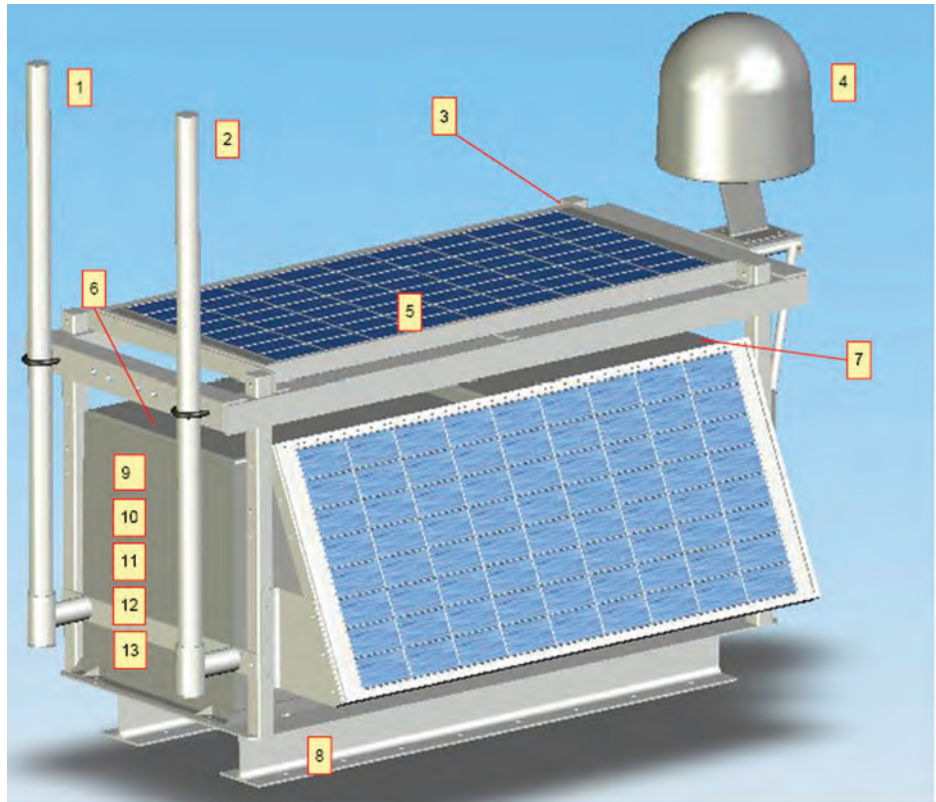
The ability to monitor environmental conditions and the dynamic performance of deepwater facilities during extreme offshore conditions is becoming increasingly important. BMT's Independent Remote Monitoring System (IRMS) allows operators to maintain communications with the asset during abandonment and receive key environmental and performance data in real-time along with video and still image capture of actual conditions on the facility. The IRMS automatically transmits high quality environmental and dynamic performance data to provide stakeholders and technical experts with operational decision making tools and to assist with risk analysis following re-boarding operations.

Key IRMS Features:

- Fully Independent system, does not require any integration with platform/vessel power and communications infrastructure;
- Web based access to near real-time offshore data and imagery;
- Fully configurable to custom specifications: standard sensors include monitoring of pitch, roll, surge, sway, heave, yaw, position, wind speed, wind direction, barometric pressure, temperature, humidity and battery condition;
- Environmental and platform response data stored on both offshore IRMS computer and dedicated web server;
- Color Imagery frequently transmitted to shore in still image, video formats and high frequency records from offshore cameras stored ready for download post evacuation;



- Operational in extreme storm conditions;
- Remote communications with shore base using integrated satellite transmission system;
- Near real-time data collected during extreme events transmitted to shore for instant evaluation;
- Data summary and trending plots automatically generated and displayed on user interface screens;
- Independent power supply from internal batteries and solar charging system;
- Ability to communicate with and control IRMS from shore via web based graphical user interface;
- Satellite positioning systems to track offset and to locate loose rigs during and after a storm;
- Easily mounted instrument sub-frame using bolted deck plate assembly, no offshore welding required for installation of any system components—allows system portability and option of re-deployment;
- Compact deck footprint of 60" x 24" (1524mm x 610mm) includes main module and full instrument array;
- Units operational from June 2006 on Gulf of Mexico deepwater facilities.



IRMS System Specifications:

The IRMS is a robust, stand-alone instrument array designed to perform in extreme offshore conditions. The system is housed in an aluminum frame and integral skid coupled to deck mounted steel foundation beams.

1. Ultrasonic wind sensor – resolution 1 deg, accuracy ± 2 deg with wind speed over 1m/s. Records up to 156 knots (80 m/s)
2. Differential GPS providing sub-meter accuracy in real time using Satellite Based Augmentation Systems (e.g. WAAS)
3. Combined pressure, humidity and temperature transmitter. Pressure range 50 to 1100hPa, accuracy ± 0.2 hPa. Humidity $\pm 1\%$ RH with 100% RH humidity range. Temperature measurement range -36°C to $+60^{\circ}\text{C}$ (-33 to $+140^{\circ}\text{F}$ with accuracy at $+20^{\circ}\text{C} \pm 0.2^{\circ}\text{C}$ (0.4°F))
4. Stabilized satellite antenna linked to geostationary satellite service with global coverage
5. 2 x 125W high efficiency solar panels using silicon nitride multi crystalline silicon-coated cells, 2 x 17.3V charging capacity at maximum power
6. Fiberglass electronics enclosures fully compliant with NEMA 4X, IP56, UL listed
7. High performance gel batteries provide operation up to 6 days without solar re-charging, deep cycle, maintenance-free batteries with 200 Ah capacity
8. Deck mounting arrangement using W6 x 15 foundation beams
9. 6 degree of freedom package consisting of 3 accelerometers and 3 angular rate sensors. Static and dynamic roll/pitch accuracy 0.01 $^{\circ}$ standard error. Acceleration accuracy 0.001 m/s 2 RMS
10. Permanently connected integrated emergency satellite telephone
11. Low power computer, LCD screen, keyboard and trackball mouse accessible within enclosure USB connections to download to various storage media
12. Battery charge controller and optional AC power charging facility
13. Digital camera system with video sample rate up to 4Hz and 640 x 480 imagery. System supports up to four cameras in the array, EX-rated housing available for Class 1, Div 1 areas