RAWS - NFDRS REVIEW CHECKLIST (1/2007)

Unit - _____ **Date -** _____

Station - _____

Key Code: E = Exceeds Standard, M = Meets Standards, NI = Needs Improvement, NR = Not Reviewed		
1) Station Siting		
Description	**Code**	**Review Comments**
The standard fire weather station should be located in a large, open area away from obstructions and sources of dust and surface moisture. The station should be on level ground where there is a low vegetative cover. Furthermore, it should be situated to receive full sun for the greatest possible number of hours per day during the fire season. If located on a slope, a south or west exposure is required to meet fire danger rating standards. **Standards** - The following rules should govern the location of a standard fire weather station: 1. Locate the station/s in a place that is representative of the conditions existing in the general area of concern. Consider vegetative cover type, topographic features, elevation, climate, local weather patterns, etc. 2. Select a site that will provide for long-term operation and a relatively unchanged exposure. Consider site development plans, e.g., roads, buildings, parking areas; ultimate sheltering by growth of vegetation; and site accessibility during the intended operational period. 3. Arrange the station so as to provide data that is representative of the specific area in which the station is situated. Consider exposure requirements for each instrument in relation to such things as prevailing winds, movement of the sun, topography, vegetative cover, nearby reflective surfaces, and wind obstructions. In accordance with the above rules, the following situations have been avoided when selecting a station site: 1. **Sources of dust** such as roads and parking areas. If unavoidable, locate station at least 100 feet on the windward side of the source. 2. **Sources of surface moisture** such as irrigated lawns, pastures, gardens, lakes, swamps, and rivers. If unavoidable, locate station several hundred feet to the windward side of the source. 3. **Large reflective surfaces** such as white painted buildings. The same holds for natural reflective surfaces such as lakes, ponds, canals, and large		

rock surfaces. If unavoidable, locate station on north side, but far enough away so as not to be artificially shaded or influenced (at least a distance equal to the height of the reflective surface or 50 feet, whichever is greater). 4. **Extensively paved or blacktopped areas.** If unavoidable, locate station at least 50 feet to the windward side. 5. **Large buildings, trees, and dense vegetation.** Locate station so that any obstructions to wind speed are mitigated according to the guidance in the Weather Station Handbook – an Interagency Guide for Wildland Managers, PMS 426-2, pages 66 and 67. 6. **Distinct changes in topography** such as gullies, peaks, ridges, steep slopes, and narrow valleys.		
2) Station Operation Period and Sensors Required to Meet NFDRS Standards		
Description	**Code**	**Review Comments**
OPERATIONAL PERIOD - The optimal operating period for all weather stations used for the NFDRS is year-round. However, the minimum operational period is dictated by the following: 1. A minimum 30-day start up period prior to the need for NFDRS indices is required for each seasonal weather station to properly calibrate the model. 2. Wildland fire season as designated by the local manager, Region, or Geographic Area Coordination Center. 3. Annual fluctuations in season length. Use of the visual greenness images available on the WFAS home page is recommended to assist the local or regional fire manager. **Non-owner use.** The following guidelines are recommended for any use of a weather station for NFDRS that is not owned by the user: 1. Notify the station owner that you are using this station for NFDRS or other applications. 2. When a longer season is required by an adjoining unit, the non-owning user should assist in the management of that station, including any additional costs for operation or maintenance. **NFDRS Stations STATION CLASSIFICATION/ OPERATIONAL STANDARDS** meets the following criteria **(Note: The minimum NFDRS standard is the Seasonal Data Collection Station)**: **NFDRS – Year Round Data Collection Stations** 1. Operates to minimum standards to support designated wildland fire season.		

2. Operates properly in accordance with Station Maintenance Policy. * 3. Equipped with the minimum NFDRS sensor compliment required for NFDRS. 4. Meets minimum quality assurance requirements. ** 5. 24-hourly readings are delivered to WIMS via GOES Satellite telemetry on an hourly basis 6. NFDRS calculations(changing the "R" to "O") are processed regularly in WIMS delivering historical data to the NIFMID database. 7. (Optional) winterized rain gauge if necessary. 8. Stations stay synchronized with coordinated universal time. GPS units or WWV synchronization clocks are required if the GOES transmissions occur on an hourly basis. GPS is the only option for High Data Rate (HDR) transmissions. **NFDRS – Seasonal Data Collection Stations** 1. Operates to minimum standards to support designated wildland fire season (can operate 12 months or less). 2. Operates properly in accordance with Station Maintenance Policy. * 3. Equipped with the minimum NFDRS sensor compliment required for NFDRS stations. 4. Meets minimum quality assurance requirements. ** 5. 24-hourly readings are delivered to WIMS via GOES Satellite telemetry on an hourly basis during seasonal operational period. 6. NFDRS calculations are processed regularly (during seasonal operational periods) in WIMS delivering historical data to the NIFMID database. 7. Stations stay synchronized with coordinated universal time. GPS units or WWV synchronization clocks are required if the GOES transmissions occur on an hourly basis. GPS is the only option for HDR transmissions. * See **Station Maintenance Policy** under 3) **Maintenance and Calibration** **** Quality Assurance –** To assure data quality for NFDRS calculations the system will be monitored at all levels of data acquisition and storage. The local station owner and line officer are responsible for ensuring weather data quality including: a) That maintenance is performed per NFDRS standards (PMS 426-3), and that this maintenance and all other significant station activity is documented in ASCADS. b) Visually checking outputs from the station on a daily basis to assure that the information is reflective of actual conditions. c) That the station is physically secure and that the site is maintained as needed.		

Other • Stations that are portable should have an indicator in their name in ASCADS and WIMS, i.e. Los Padres Portable #1. • Station information in ASCADS and WIMS (latitude/longitude, elevation, name, etc.) should match exactly. **Manual Weather Stations** - Includes manual stations providing basic NFDRS inputs to WIMS during operational period. The one observation is delivered to WIMS every 24-hour period during operating season. Stations are maintained according to the publication NFES 2140 A Weather Station Handbook - An Interagency Guide for Wildland Managers. (**Note: This classification goes away when full transition to the NFDRS Update has taken place which should be completed by fire season 2006)** **Minimum NFDRS Standards for all weather stations:** 1. NFDRS required Sensors must be able to: a) Provide hourly measurements of precipitation duration and amount. b) Measure an instantaneous air temperature reading each hour (within 5 minutes of transmission time). c) Compute a measure measured 10-minute averages for the following variables (within 15 minutes of assigned transmission time: • Relative humidity • Wind direction • Wind speed d) Compute a 60-minute average solar radiation values for the hour prior to transmission. 2. Only OBSERVED measurements of fuel conditions are to be used. This means only physically weighed 10 hour fuel stick values will be used verse using the fuel moisture sensor outputs from the fuel moisture sensors mounted on some stations. The fuel moisture sensors outputs are based on algorithms for that sensor. 3. GOES telemetered station sensor update readings will coincide with the assigned transmission time. The instantaneous readings must be taken within the 5 minutes up to and including the transmission time. Further, if 10-minute averages are taken, the sensor average readings are taken within the 15 minutes prior to the assigned GOES transmission time. Example: if a station transmits to GOES at 45 minutes past the hour, the sensor's instantaneous readings must be taken between 40 and 45 minutes past the hour and the averaged readings must be taken between 30 and 35 minutes past the hour.		

4. Universal Time Coordinated – The station must stay synchronized with coordinated universal time. GPS units or WWV synchronization clocks are required for hourly (or more frequent) GOES transmission. Any station operating on the High Data Rate on the GOES satellite must use GPS instead of WWV.		
3) Maintenance, Calibration and Life Cycle Management		
Description	**Code**	**Review Comments**
Station Maintenance Policy - Failures of systems or components require emergency repair. Various methods, both automated (such as ASCADS/Watchdog) and manual, are used in keeping abreast of the operations of the complete weather station network. The watchdog evaluates various system operations to give accurate indications of how a system is performing. 1. **Annual maintenance** – In order to ensure accurate weather readings, every NFDRS RAWS station must receive, at a minimum, one annual on site visit (+/- 45 days of last annual maintenance date) to ensure sensors are within calibration standards, and verify site and station conditions. Field maintenance can be broken in to two types. **ANNUAL MAINTENANCE AND SENSOR REPLACEMENT STANDARDS.** Sensors and key components of an NFDRS RAWS station must be recalibrated or replaced on a regular basis to ensure the collection of consistent and reliable weather data throughout the RAWS network. Annual service of RAWS stations will help ensure general station integrity, perform necessary preventative maintenance, and replace sensors and components prior to expiration of their calibrated lifetimes. Listed below is the specific equipment yearly maintenance and minimum replacement times for each component. **Field Service Maintenance Standards (The servicing personnel may perform this function within =/- 45 days of the yearly expiration date and still meet NFDRS maintenance standards):** **Tipping Bucket** - Disassemble, clean, check all connections and verify that the instrument is level. Unless the Data Logger/DCP resets the rain year automatically on a certain date each year, reset the tipping bucket to 00.00, then simulate 00.02 inches of rain and validate that it was recorded by the Data Logger/DCP. • **MINIMUM FIELD VALIDATION - 1 Year *** • **MINIMUM DEPOT CALIBRATION/REPLACEMENT - 3 Years**		

Wind Speed - Check for damage and alignment of cups, ice skirt, free movement of bearings. • **MINIMUM CALIBRATION/REPLACEMENT - 2 Years *** **Wind Direction** - Check for damage of pointer and feather, free movement of bearings. Manually rotate the sensor through each of the four quadrants and scan the data for accuracy. • **MINIMUM CALIBRATION/REPLACEMENT - 2 Years *** **Ultrasonic Wind Speed/Wind Direction -** No calibration required, clear any obstruction between arms of transducers. **Relative Humidity/Air Temperature** - Not field serviceable; do not open. • **MINIMUM CALIBRATION/REPLACEMENT – Yearly *** **Fuel Temperature** - Check for deterioration and cracking of the wood. (**This is an optional sensor but if placed on the station this is the maintenance standard)**. • **MINIMUM CALIBRATION/REPLACEMENT - 3 Years** **Fuel Moisture** - Not field serviceable; do not open. (**This is an optional sensor but if placed on the station this is the maintenance standard)**. • **MINIMUM CALIBRATION/REPLACEMENT – Yearly** **Fuel Moisture/Fuel Temperature –** Not field serviceable. This is an optional sensor. . (**This is an optional sensor but if placed on the station this is the maintenance standard)**. • **MINIMUM CALIBRATION/REPLACEMENT - Yearly** **Battery** - Perform a voltage test. Replace batteries according to manufacturer recommendations or if you suspect problems. Some manufacturers recommend yearly, others recommend every three years. • **MINIMUM CALIBRATION/REPLACEMENT - 3 Years * for internal** • ***"D" cell (Supplemental Power) - yearly*** **WWV Receiver** - Perform pass/fail functional check and replace if necessary. • **MINIMUM CALIBRATION/REPLACEMENT - As Needed** **GOES Antenna** - Check for broken, loose, or bent elements, proper alignment, and connectors for corrosion.		

• **MINIMUM CALIBRATION/REPLACEMENT - As Needed** **Cables** - Check for cracking, deterioration, corrosion, proper routing, and security. Ensure "O" rings are installed on all connectors. Replace as required for corrosion, aging, etc. Treat all connectors with moisture inhibitor. • **MINIMUM CALIBRATION/REPLACEMENT - As Needed** **Tower** - Check for structural damage, proper alignment, and leveling. Be aware of potential risk to safety when dealing with a potentially damaged tower (i.e., tower rust, corrosion, cable frey, etc.). • **MINIMUM CALIBRATION/REPLACEMENT - As needed, if structure is compromised or as per manufacturer's specifications.** **DCPs and Data Loggers** - Check for security, damage, and ensure that all cables are properly connected. Verify the unit has the most recent version of the software or firmware installed. Change out as needed (defective, evidence of moisture, corrosion, rust, etc.). • **MINIMUM CALIBRATION/REPLACEMENT - As needed or in accordance with manufactures specifications.** **Solar Radiation** - Sensor must be cleaned periodically using only *water* and/or a mild detergent such as dishwashing soap. • **MINIMUM CALIBRATION/REPLACEMENT - 2 Years** *** Minimum replacement time represents the optimum time to change any individual component.** 2. **Unscheduled Maintenance/Emergency Repair –** a) Year-round response time to GOES system time drift will be immediate unless determined that there is not interference with another station. b) All other NFDRS station failures will respond as appropriate: i. Response to missing and/or bad data, during fire season, should be initiated immediately. ii. Outside of fire season repair must take place before the station is initiated for the next fire season. **Standards:** 1. Unit has an individual identified to receive the weekly Watchdog reports. 2. Individual on unit identified to received the Watchdog is also designated to take action or arrange for action to be taken. **VEGETATION AROUND WEATHER STATION**		

All vegetation for a radius of 20 feet around the station is removed. Also that vegetation around weather station that will affect wind speeds will need to be removed. Clear/removed so that the distance of the station from surrounding vegetation is at least 7X the height of the surrounding vegetation. **DOCUMENTATION –** Without documentation the work completed on a station is viewed as not to have taken place, thus the importance of careful documentation. **Standards:** 1. Documentation of all site visits will be captured in the ASCADS database. It is the responsibility of every person that visits the site to assure that ASCADS is updated and reflective of the conditions of the station. This will include, at a minimum: a) Maintenance date (date that Relative Humidity/Air Temperature was changed/calibrated. b) Specific sensors and serial numbers of the sensors. c) A narrative of the site visit, including the date of the visit, the personnel at the site and what maintenance was accomplished. 2. Owner will maintain a hard copy documentation file for each station. This will include photos, site access instructions, purchase history, sensor replacement dates, serial numbers, next scheduled maintenance and other related site information. 3. Complete Station information (location, elevation, data measurement elements etc.) will captured in the ASCADS database. For latitude and longitude, NAD83 is the datum standard to be used and be recorded in degrees, minutes, and seconds. 4. Photos taken in the four compass point direction are posted on the RAWS web page. **LIFE CYCLE MANAGEMENT** Ten years is the recommended life –cycle rotation for weather stations. A lifecycle management plan for the weather station network is in place and budgeted for. **Standards:** 1. A plan is in place to replace older stations, i.e. Vaisala 540. Note that a full station replacement is not necessary. Only the DCP and a few minor components will need replacement. 2. Plan assures that all stations in use in **2013** will be equipped with GPS units and HDR transmitters so they will meet the **2013** High Data Rate GOES transmission requirement.		
4) NFDRS - Data Entry and Quality Assurance		

Description	Code	Review Comments
Data Entry and Outputs - NFDRS calculations are processed regularly (during seasonal operational period) in WIMS delivering historical data to the NIFMID database. NFDRS indices are broadcasted and/or electronically distributed on a daily basis. **Standards:** 1. All days with available RAWS data for regular scheduled observation times will be processed in WIMS. ("R" changed to "O") 2. A continuous record of daily observations, i.e. "O", will be entered into WIMS prior to the beginning of the operational period. (30-45 days) 3. During the operational period observations will be processed in WIMS on the same calendar day and prior to 1500 so that forecasted indices can be produced. **4. Fire business thresholds are identified and communicated.** **Quality Assurance –** Unit has a NFDRS Operating Plan in place that follows the guidance provided in the Redbook. NFDRS model is properly managed and the inputs are current and match the vegetation/fuels seasonal response to weather inputs. To assure data quality for NFDRS calculations the system have been monitored at all levels of data acquisition and storage. NFDRS outputs are tracked. Fire business thresholds are identified. **Standards:** **1.** Unit has an approved NFDRS Operating Plan (See suggested outline in Redbook). **2.** Unit has a system in place to track NFDRS daily outputs. **3.** Unit has personnel trained in NFDRS (completed WIMS and S-491) assigned to data entry, and quality assurance responsibilities. **4.** Seasonal NFDRS model inputs, i.e. Frozen, Greenup, Cured, correspond to vegetative conditions in fire danger rating area. 5. Fire business thresholds are identified and communicated. 6. First level of quality assurance includes: a) Visually checking WIMS NFDRS outputs from the station on a regular basis (daily) to assure that the information is reflective of actual conditions. b) Visually check each weather station's outputs and the ASCADS Watchdog report to assure that there are no bad sensors on the station. A process is in place that in the event that bad sensors are identified that prompt repair will take place.		