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science for a changing world

Field SOP Changes to Improve Performance

NetOps X

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U.S. Geological Survey

Overview

- 3 parts to the session title:
  Field SOPs + Changes + Improve Performance

- I interpret this to mean how to use field standard operating procedures (SOPs) as a tool to improve consistency of station performance, taking corrective action when needed.

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Questions/topics posed to the NetOps group

- Field checklists, best practices, or other information related to how you install and maintain stations that perform well.
- How do you ensure consistency over time and with staff changes?
- How do you manage information like field notes, photos, etc.?
- What State of Health tools do you use, and how does it inform field visits?
- Do you leverage tools like MUSTANG to monitor station performance, and if so how?
- If you see a poorly performing station, how do you address it?

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PNSN

Left: Siting Checklist

Right: Install Checklist

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Tech_____ Date /m_____/d_____/y_____ Station_____

Type of site: SM__, BB__, SP__ Free Field__, Repeater__, Name of site_____

GPS____._____ -_____._____ Ely_____

Address:_____ Zip_____

Contact type: Land owner___, Site Manager___, Network___, Associate___, Other___

Name _____

Phone _(____)_____, _(____)_____

Contact type: Land owner___, Site Manager___, Network___, Associate___, Other___

Name _____

Phone _(____)_____, _(____)_____

Location type : first floor__, outside main structure__, garage__Basement__, house__,
fire station__, Gov building__, Grass field__, Cattle field__, Forested__
Simi Arid__, Forest__, Wall Mount__, Roof Mount__, Tower Mount__, School__,
Slab__, Plantation__,Closet__

Noise Sources: AC pump__, Fan__, Rd__,Children__, Water__, Plane__, Wind__,
Power generation__, Doors__, Plumbing__, N/A__

Distance to Nearest Rd_____, GPS cable distance_____,

Power options: Solar___, Outdoor AC___, Indoor AC___, Alternate___, UPS___, Gen___

Communications options: Cell__, WAN Fiber__, WAN Copper__, LAN__, Radio UHF__
Radio VHF___, Satellite___, Alternate___

Antenna mounting options: Roof Mount__, Pole mount__, Rohn mount__, Indoor mount__,

Enclosure Mounting options: Wall__, Floor__, Closet__, Concrete__, Wood__, Metal__

MOA finished yes___, no___

Photos?___

SITE LAYOUT:

sitting

Tech_____ Date /m_____/d_____/y_____ Station_____

Type of installation: IndoorPWD__, OutdoorPWD__, Solar__, SwingSet__, Desert__
3ch__, 4ch__, 6ch__, Vault__, PostHole__, Slab__, 202020__, 202012__, Repeater__,
Feefield__, Building__, Basement__, Post hole__, Other_____

GPS____._____ -_____._____ ely____ ft__m____

Access Notes:_____

Battery type start:#___ AGM__, SLA__, GEL__ 35amphour__, 100amphour____
Battery system Voltage:_____V, Solar Series__, Solar Parallel__
Solar system Voltage:_____V, Batt Series__, Batt Parallel__
Solar Controller type start MPPT__, PWM__, Other__, n/a____, Model_____
Solar Panel: start Model_____, Watts ea_____W, Voltage ea_____V
Surge protection: Type_____, #___, Type_____, #____

XCVR type: start _____
Antenna sys start yagi__#__whip__#__, Dish__, LMR400__LMR195__RG58__RG11__
Antenna Gain_____, Antenna Gain_____, Antenna models_____
Antenna azimuth_____deg, Antenna azimuth_____deg

Digitizer type, s/n start _____, _____

Sensor type, s/n start _____

Sensor type, s/n start _____

Sensor SM offsets X_____Y_____Z_____,BB X_____Y_____Z_____

Sensor SM offsets X_____Y_____Z_____,BB X_____Y_____Z_____

Karl Hagel

PNSN

Left: Maintenance Checklist

Right: Reminder Checklist

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Tech _____ **Date** /m____/d____/y_____ **Station** _____

PROB: Network__ Radio__ Power__ Landowner__ Access__ Maintenance__ Unknown__
Removal__ VCO__ Antenna__ Check up__ Battery__ Digitizer__ Sensor__ Water__

Access condition: good__ medium__ bad__ failure to access__, Gate: yes__ no__ key_____

GPS_____ _____ -_____._____ ely____ ft__ m__

Voltage start Solar _____, Battery_____, Output_____
Voltage end Solar _____, Battery_____, Output_____

Battery type start: AGM__, SLA__, GEL__ 35amphour__, 100amphour__, #_____

Solar Controller type start MPPT__, PWM__, Other__, n/a____, Model_____

Solar Panel: start Model_____ end Model_____

XCVR type: start _____ end_____

Antenna sys start yagi__#__whip__#__Dish__LMR400__LMR195__RG58__RG11__
Antenna Type: _____

Digitizer type, s/n start _____ end_____

GPS Last lock Time_____

Sensor type, s/n start _____ gain____ end_____ gain_____

Sensor type, s/n start _____ gain____ end_____ gain_____

Sensor SM offsets X_____Y_____Z_____ BB X_____Y_____Z_____

Sensor SM offsets X_____Y_____Z_____ BB X_____Y_____Z_____

External IP__ Internal IP__ Digitizer__ Comms__
IP____.____.____.____ Mask ____.____.____.____ Gate____.____.____.____

External IP__ Internal IP__ Digitizer__ Comms__
IP____.____.____.____ Mask ____.____.____.____ Gate____.____.____.____

_____

_____

Tech _____ **Date** /m____/d____/y_____ **Station** _____

Maintenance:

PROB: Network__ Radio__ Power__ Landowner__ Access__ Maintenance__ Unknown__
Removal__ VCO__ Antenna__ Check up__ Battery__ Digitizer__ Sensor__ Water__
Access condition: good__ medium__ bad__ failure to access__, Gate: yes__ no__ key_____
GPS_____ _____ -_____._____ ely____ ft__ m__
Voltage start Solar _____, Battery_____, Output_____
Battery type start: AGM__, SLA__, GEL__ 35amphour__, 100amphour__, #_____
Solar Controller type start MPPT__, PWM__, Other__, n/a____, Model_____
XCVR type: start _____ end_____
Antenna Type: _____
Digitizer type, s/n start _____ end_____
Sensor type, s/n start _____ gain____ end_____ gain_____
Sensor SM offsets X_____Y_____Z_____ BB X_____Y_____Z_____
IP Address

Installation:

Type of installation: IndoorPWD__, OutdoorPWD__, Solar__, SwingSet__, Desert__
3ch__, 4ch__, 6ch__, Vault__, PostHole__, Slab__, 202020__, 202012__, Repeater__,
Feefield__, Building__, Basement__, Post hole__, Other_____
GPS_____ _____ -_____._____ ely____ ft__ m__
Battery type start:#___ AGM__, SLA__, GEL__ 35amphour__, 100amphour____
Battery system Voltage:_____V, Solar Series__, Solar Parallel__
Solar system Voltage:_____V, Batt Series__, Batt Parallel__
Solar Controller type start MPPT__, PWM__, Other__, n/a____, Model_____
Solar Panel: start Model_____, Watts ea_____W, Voltage ea_____V
Surge protection: Type_____, #___, Type_____, #____
XCVR type: start _____
Antenna sys start yagi__#__whip__#__, Dish__, LMR400__LMR195__RG58__RG11__
Antenna Gain_____, Antenna Gain_____, Antenna models_____
Antenna azimuth____deg, Antenna azimuth____deg
Digitizer type, s/n start _____, _____
Sensor type, s/n start _____
Sensor SM offsets

Sitting

Type of site: SM__,BB__,SP__Free Field__, Repeater__, Name of site_____
GPS_____ _____ -_____._____ Ely_____
Name , Contact type, Phone , cell, office
Location type : First floor, basement, outbuilding, outdoor, indoor, residetntial, garage.
Noise Sources: AC pump__, Fan__, Rd__Children__, Water__, Plane__, Wind__,
Power generation__, Doors__, Plumbing__, N/A__
Distance to Nearest Rd_____GPS cable distance_____,
Power options: Solar___, Outdoor AC___, Indoor AC___, Alternate___, UPS___, Gen___
Communications options: Cell__, WAN Fiber__, WAN Copper__, LAN__, Radio UHF__
Radio VHF___, Satellite___, Alternate___/Antenna Mount options.
MOA finished yes___, no___
Photos?___

Karl Hagel

University of Oregon

- **Site assessment rubric to grade sites in 4 categories and come up with a list of prioritized maintenance needed.**

Power

* Is the battery bank above warning level 100% of the year?

If no: Automatic F: Has the site's power worked consistently since last field visit?

Are the batteries less than 10 years old?

Are the power components within end-of-life limits?

Are the power components up to our current standard?

* = 2 point question
** = 3 point question
Otherwise:
Yes = 1 point,
No = 0 points

5 points = A, 4 points = B, 3 points = C, 2 points = D, ≤1 point = F

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Sara Meyer

University of Oregon

- **Site assessment rubric to grade sites in 4 categories and come up with a list of prioritized maintenance needed.**

Telemetry

* Are Nagios telemetry data charts maintaining 100% above warning level?

    If no: Automatic F: Is the site staying online more than the minimum allowed percentage?

Is the 3-month average data latency within acceptable ShakeAlert standards?

Are all telemetry devices within end-of-life limits?

Do no higher quality telemetry types exist for this site?

* = 2 point question
** = 3 point question
Otherwise:
Yes = 1 point,
No = 0 points

5 points = A, 4 points = B, 3 points = C, 2 points = D, ≤1 point = F

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- **Site assessment rubric to grade sites in 4 categories and come up with a list of prioritized maintenance needed.**

Seismic Instrumentation

** Are the sensors providing high-quality data?

Are the sensors and digitizer within end-of-life limits?

Is the digitizer operating nominally?

* = 2 point question
** = 3 point question
Otherwise:
Yes = 1 point,
No = 0 points

5 points = A, 4 points = B, 3 points = C, 2 points = D, ≤1 point = F

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- **Site assessment rubric to grade sites in 4 categories and come up with a list of prioritized maintenance needed.**

Site Infrastructure

** Is the landowner still happy with the site?

If no: Automatic F: Is the host not making any change requests to the site's layout or infrastructure?

Are there no major known issues with site components?

Are there no open tickets for site infrastructure?

Is the site infrastructure up to our current standard?

* = 2 point question
** = 3 point question
Otherwise:
Yes = 1 point,
No = 0 points

5 points = A, 4 points = B, 3 points = C, 2 points = D, ≤1 point = F

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Other input from the room

- Prioritize what must be recorded on site (vs. access remotely)
- Staging checklists, fill in the blank logs/checklists
- Include past metrics in your lists to have in the field, also what needs to happen next time
- Writing in field inconvenient – need an app that integrates photos
- Backup information as soon as you can (don’t rely on memory)
- Pass on knowledge, collect documentation in a wiki
- How to manage photos, link into SIS

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Other input from the room (cont.)

- The “last mile” telemetry problem diagnosing, checking in with the people in office
- Text message “virtual Mike” at Caltech/SCSN – automatic reply back to the tech in the field (Igor’s code)
- Caltech also has bandwidth test scripts, run ~daily
- SIS realtime waveform feature, can even do stomp test (need internet)
- Latency/telemetry – troubleshoot in the field to a point (ping)
- Data quality itself – takes experience

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Summary and Conclusions

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