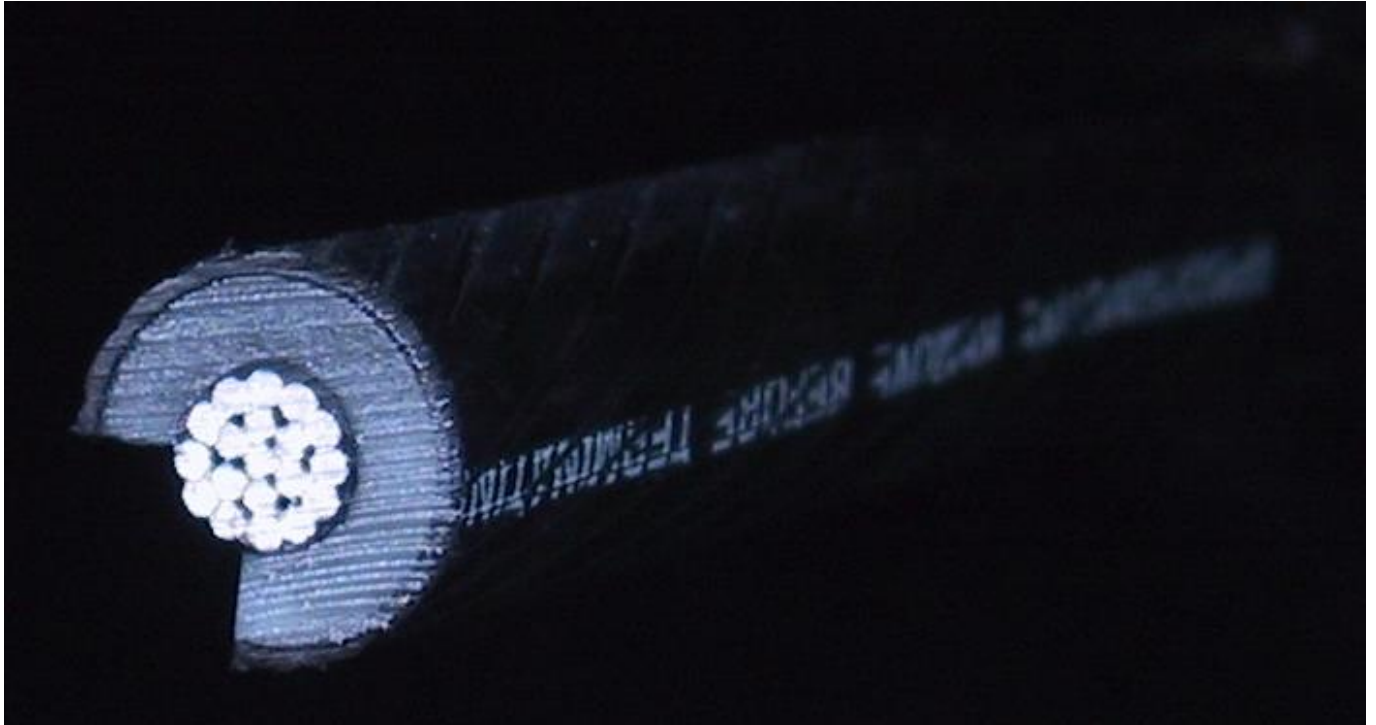


## Rejuvenation Instructions

### #200 – Field Verification Checklist



#### This NRI covers the following:

- How to verify the safety and quality of Novinium brand services and products.
- Provides a checklist to help organize observations.

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Patents: <http://www.novinium.com/patents/>



**WARNING:** It is dangerous working around energized high-voltage systems, pressurized systems, and chemicals. Always work in accordance to the Novinium Field Operations Safety Handbook (FOSH) or other local governing safety standards.

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## Purpose

- The field verification worksheet provides a checklist to help organize observations.
- The checklist is not exhaustive and the observer should probe beyond the checklist where appropriate.
- Each question includes a unique reference in the following form of “**NN/Step/#**” (e.g., 00/1-02/1), where:
  - “**NN**” is the 2-digit NRI number.
  - “**Step**” is the step designation within the NRI.
  - “**#**” is a sequential number appended when there is more than a single question per step.
- Answer questions by checking either the “**Y**” (yes) or “**N**” (no) columns and un-checking the “**n/o**” (not observed) column.
  - All “**N**” (no) answers must include a comment, and where the observation is made on a specific segment number, the 8-digit segment number must be included within the comment.
  - Comments should be entered where appropriate.

## Field Verification Checklist

Reference	Question	Y	N	n/o	Comment (segment #)
<b>00-Safety</b>					
00/1-02/1	Job planning conference held at the start of the day?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
00/1-02/2	Job planning conference properly documented?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
00/1-12	PPE: Appropriate clothing? FR?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
00/1-16/1	PPE: Proper use of hard hats?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
00/1-16/2 00/7-41	PPE: Proper care and use of dielectric gloves?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
00/1-16/2	PPE: Proper care and use of dielectric footwear?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
00/1-35	PPE: Safety glasses with side shields worn at all times?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
00/3-11	Drivers comply with speed limits?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
00/5-01 00/7-35	Clearance is obtained before switching operations?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
00/5-07	Clearance is repeated to assure mutual understanding?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
00/5-09 00/7-37	Cable is properly treated as energized until opened, tested, and grounded?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
00/7-02	All persons are qualified for their assigned tasks?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
00/7-21	All energized components are securely blanketed?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
00/7-30	Are cables spiked when necessary?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
00/7-47	Excavation is done properly? Barriers, barricades, safe exit, etc.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

Reference	Question	Y	N	n/o	Comment (segment #)
<b>10-Inspect &amp; Pinpoint</b>					
10/01 10/02 10/03	Cables are thoroughly inspected for insulation shield damage, bend radius issues, eccentric insulation, carbon tracking on interfaces, strand corrosion, and severed strands?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
10/04	An impedance streamliner is used properly?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
10/05a	TDR VOP is physically verified periodically?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
10/05f	All impedance anomalies are properly identified and recorded?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
10/05j 10/05k	TDR waveforms are stored properly and uploaded to NITS?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
10/06	RF transmitter/locator is used properly?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
11	A bending radius template is available and used when appropriate?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
<b>20-Tailored Formulation™ &amp; Tailored Pressure™</b>					
20/01	Cable position in the 5P's hierarchy has been correctly identified and entered into NITS?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
20/02	Temperature of soil at cable depth has been estimated?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
20/03	Cable load has been categorized and a preliminary fluid composition determined?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
20/06	Team is looking for and recording visible writing on cable?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
20/07	Team leader can identify the insulation material?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
20/08b	The conductor size has been properly measured and recorded in NITS?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
20/08c	The outside diameter of an individual conductor strand was measured and recorded.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
20/09	The nominal insulation thickness is properly obtained?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
20/10	The conductor compression has been properly obtained and recorded.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
20/11	When required the 212 mixing table was used correctly?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
20/17	The TIP was calculated properly?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
20/18	The fluid choice from NRI-20, step 3 is modified consistent with the requirements of NRI-20, step 18?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
20/19	The proper entry of the fluid is made into NITS?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
25/01	N-Ter™ technology is used when appropriate?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
25/02	An adequate return current path has been confirmed before applying N-Ter™ technology?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
25/04	All safety precautions on the N-Ter™ current source are observed?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
25/05	The N-Ter™ current source is properly connected?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

Reference	Question	Y	N	n/o	Comment (segment #)
25/06	The appropriate settings and timings for the N-Ter™ current source are used to warm the conductor?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
<b>30-IA Installation</b>					
30/01	The component installed over an IA is Novinium Certified?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
30/02	Where there is cable slack the old compression connector is cut off adjacent to the crimp nearest the insulation?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
30/03a	Where there is insufficient cable slack the old compression connector is cut off adjacent to the crimp furthest from the insulation?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
30/03b	The connector cut-off tool is used to remove the compressed portion of the old compression connector?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
30/04	The conductor ends are square?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
30/05/1 30/07	The diameter of the new compression connector has been measured and is within the tolerance of the proposed IA?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
30/05/2	The compression connector is solid or has been sealed?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
30/06 30/07	The OD of the insulation has been measured and is within the tolerance of the proposed IA?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
30/08/1	Insulation shield is cutback utilizing a scoring tool?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
30/08/2	A proper template is used before <u>and</u> after the insulation shield is cutback?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
30/09	The tool stop is placed with a proper template?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
30/10	A Speed Systems, Mark I (Novinium mod A) insulation stripper is used to cut back the insulation, and the strands are not cut or nicked?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
30/11	The template is used after all cutbacks are completed to confirm quality?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
30/12	Strands are fanned and thoroughly cleaned?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
30/15 30/16	Compression connector barrel and strands are wire brushed with anti-oxidant grease?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
30/17	2-3 wraps of No.20 copper wire are applied properly inside the fanned outermost conductor strands and the strands are properly re-bundled?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
30/18	An insulation positioning line is drawn around the circumference with a thimble?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
30/19	Swage lubricant is applied at least daily to swage dies?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
31/02a-e	Compression connectors are shortened when required?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
31/02f 34/02	Connector has a circumferential line drawn as a QA reference for IA installation?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

Reference	Question	Y	N	n/o	Comment (segment #)
31/03 32/03 34/08	4-digit Novinium certification number is recorded on IA with indelible marker?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
31/04 32/04 34/09	IA fits over the insulation properly and positioning line is flush with IA end.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
31/05 32/06 34/10	Tool stop is positioned with alignment pin, rounded shoulder toward cable end?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
31/06 34/11	Compression connector seats over conductor and into the IA such that the positioning line is flush with the IA?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
31/07 31/10 32/07 32/10 34/12 34/15	The 4-digit die number used for compressions matches the die designation on the IA?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
31/09 32/09 34/14	Half-pipe spacer is used to place positioning tool?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
31/12 32/15 34/17	Swages are deburred with 3M® Scotch-brite™ pad?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
31/14 31/15a-c 32/17 32/18a-c 34/19 34/20	All cutbacks are correct and confirmed with template, all surfaces are free of defects, and swages remained within swaged portion of IA?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
31/15d 32/18d	All depressions in insulation adjacent to swage are filled with Hi-K mastic?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
32/02	Marking tape is applied as shown in the Novinium template to assure final placement of the splice body?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
32/20	Splice body is positioned between marking tapes within a maximum ¼" tolerance?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
34/01	Measured and recorded barrel depth of compression connector?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
34/03	Cut-backs are properly calculated?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
34/07	Tool stop is positioned with shoulder away from cable end as calculated in NRI-34 Steps 3-6?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
39/01	Infrared thermograph of loaded cable does not identify hot spots on terminations or splices?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
39/02	Partial discharge (pd) detector does not identify pd activity in terminations or splices of energized circuit?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
<b>40-IT Installation &amp; Removal</b>					
40	Injection tool is used and cared for properly?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
40/15	Plug pin is flush and leak-free?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
<b>50-IT Flow &amp; Pressure Testing</b>					
50	Pre-injection flow and pressure testing are used when appropriate?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

Reference	Question	Y	N	n/o	Comment (segment #)
50/01/1	Termination tests are performed properly?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
50/01/2	CTAs are secured with at least 2 neutral wires or an equivalent restraint?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
50/02a	Flow tests are performed properly at 44 psig?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
50/02b	Pressure tests are performed properly at 88 psig?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
<b>60-Tailored Injection™</b>					
60/04a	Fluid flows in order from feed tank through filter, rotometer, valve, and injection tool into cable.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
60/04b	Tank pressure is set the proper Tailored Injection Pressure (plus up to 10% for attended operations)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
60/04c	Pressure relief valve has not been tampered with?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
60/04d	Tank is level and fluid level is accurately recorded from the meniscus before the fluid feed is started?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
60/05	Appropriate flush bottle and/or basin are used to collect flushed fluid?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
60/08	The actual fluid supplied to the cable is near the target and between the floor and ceiling of the Cable Table NRI-21?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
60/09	Warranty tag is properly punched and installed on cables with injection completed?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
<b>69-N-Rex™ Injection</b>					
69	N-Rex instructions are followed?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
69/08/1	Metal tubing sweeps are secured from injection tool, maintain appropriate phase-to-phase and phase-to-ground clearance, and connect the IA with the top of a high voltage fluid interface (HVFI)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
69/08/2	From the bottom of the HVFI metallic tubing is connected to the injection equipment and each tube end is identified with marking tape to avoid phase confusion?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
69/08/3	The bottom of the HVFI is bonded to the system neutral with a conductor of sufficient ampacity to carry fault current and trip system protective devices in the event of a HVFI fault?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
69/08/4	All injection equipment is raised above any potential flooding and secured from the public?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
<b>70-Troubleshooting flow</b>					
70/2	Team can calculate the estimated time of fluid arrival?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
70	Team executes appropriate cable flow troubleshooting steps?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
75	Team executes appropriate feed flow troubleshooting steps?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

Reference	Question	Y	N	n/o	Comment (segment #)
<b>80-Repairing neutral corrosion</b>					
80/1	Excavation spans from workable neutral to workable neutral?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
80/2	Anode is at least 6 feet from cable?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
80/3	Equipotential grounding mat is used for steps 4-7?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
80/4	Neutrals are wire brushed where clamps are attached?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
80/5	New neutrals are applied helically around cable and tie-wrapped in intimate contact with remaining neutrals and insulation shield?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
80/6	2 neutral clamps are used to connect old neutrals to new neutrals and to the sacrificial anode?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
<b>90-Novinium Injection Tracking System (nits)</b>					
90	All required <b>nits</b> data is entered within 24 hours	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	