

Subregional RTEP Committee - Western FirstEnergy Supplemental Projects

November 17, 2023

Needs

Stakeholders must submit any comments within 10 days of this meeting in order to provide time necessary to consider these comments prior to the next phase of the M-3 process

Need Numbers: APS-2023-064 to APS-2023-069

Process State: Need Meeting 11/17/2023

Project Driver:

Equipment Material Condition, Performance and Risk

Specific Assumption Reference:

System Performance Projects Global Factors

- System reliability and performance
- Substation/line equipment limits

System Condition Projects

- Substation Condition Rebuild/Replacement

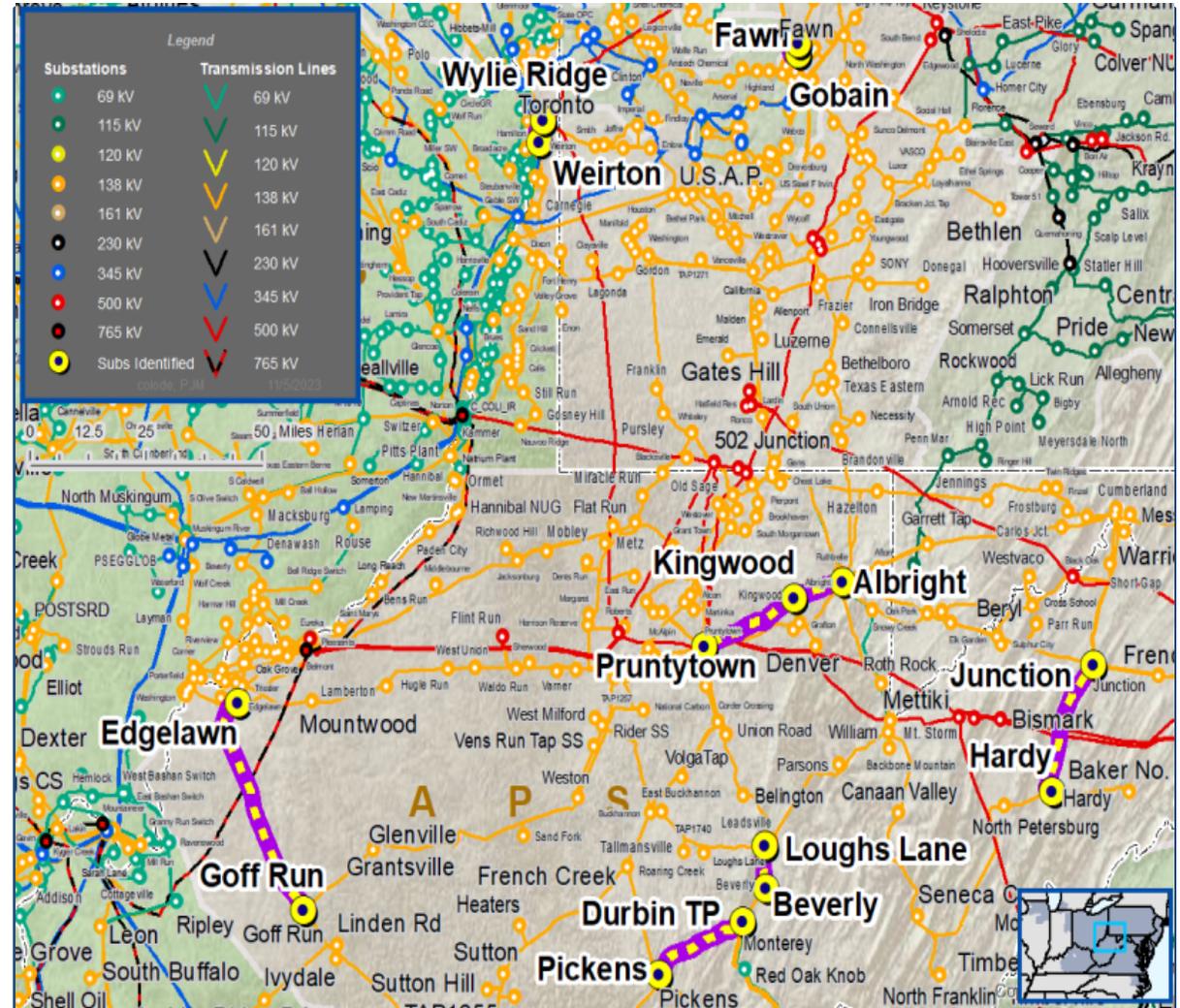
Upgrade Relay Schemes

- Obsolete and difficult to repair communication equipment (DTT, Blocking, etc.)
- Communication technology upgrades

Problem Statement:

- FirstEnergy has identified protection schemes using a certain vintage of relays and communication equipment that have a history of misoperation.
- Proper operation of the protection scheme requires all the separate components perform adequately during a fault.
- In many cases the protection equipment cannot be repaired due to a lack of replacement parts and available expertise in the outdated technology.
- Transmission line ratings are limited by terminal equipment.

Continued on next slide...





APS Transmission Zone M-3 Process Misoperation Relay Projects

Need #	Transmission Line / Substation Locations	Existing Line Rating (SN / SE)	Existing Conductor Rating (SN / SE)
APS-2023-064	Weirton – Weirton JCT 138 kV	292 / 314 / 325 / 343	308 / 376 / 349 / 445
	Weirton JCT – Wylie Ridge 138 kV	292 / 314 / 325 / 343	308 / 376 / 349 / 445
APS-2023-065	Edgelawn – Goff Run 138 kV	195 / 209 / 217 / 229	221 / 268 / 250 / 317
APS-2023-066	Albright – Kingwood 138 kV	187 / 209 / 217 / 229	221 / 268 / 250 / 317
	Kingwood – Pruntytown 138 kV	221 / 268 / 250 / 287	221 / 268 / 250 / 317
APS-2023-067	Loughs Lane – Beverly T 138 kV	164 / 191 / 191 / 191	169 / 213 / 217 / 280
	Durbin T – Pickens 138 kV	169 / 209 / 217 / 229	169 / 213 / 217 / 280
APS-2023-068	Hardy – Junction 138 kV	159 / 191 / 179 / 226	221 / 268 / 250 / 317
APS-2023-069	Fawn – Gobain 138 kV	287 / 287 / 287 / 287	297 / 365 / 345 / 441

Need Numbers: APS-2023-055

Process State: Need Meeting 11/17/2023

Project Driver:

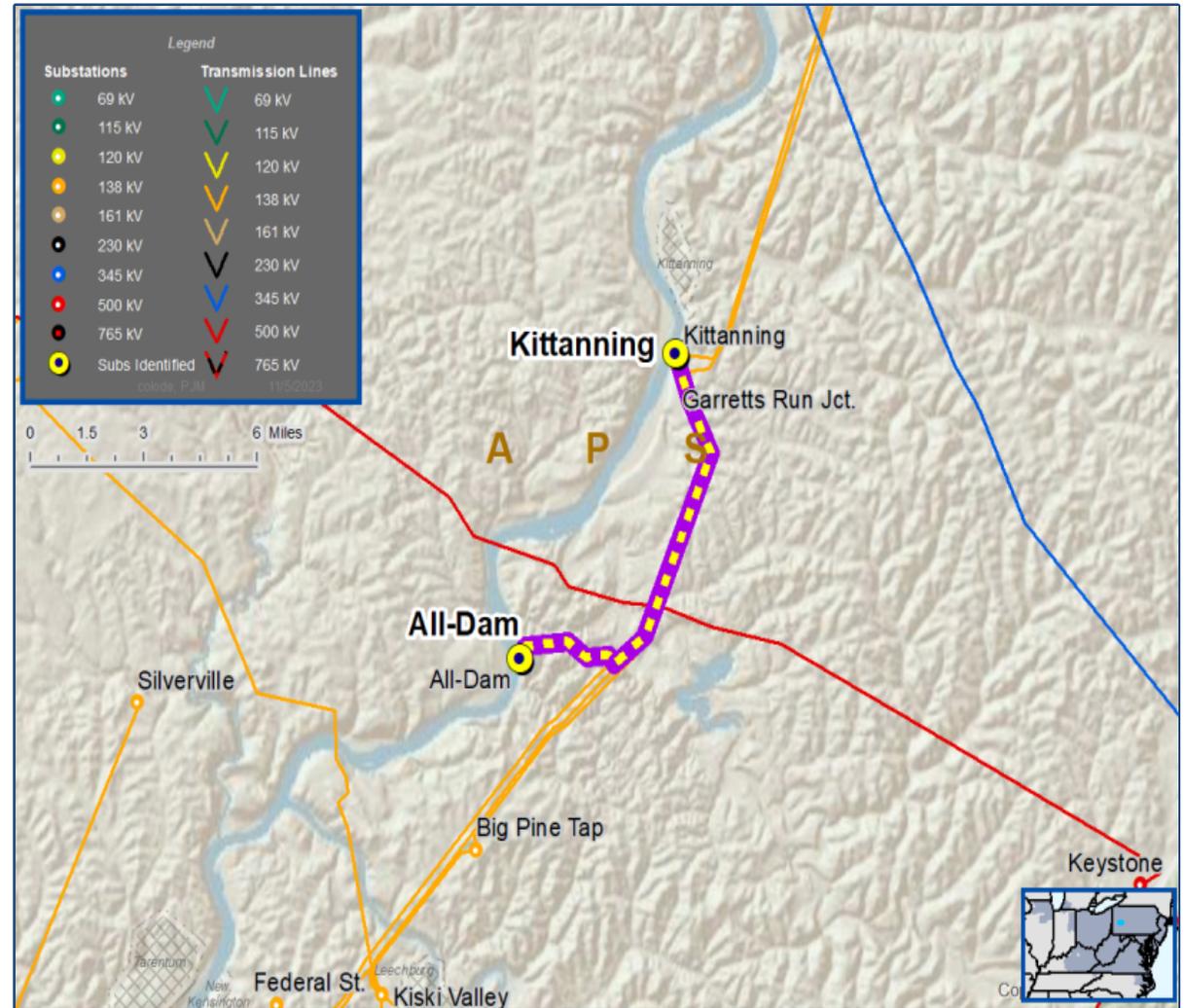
- *Equipment Material Condition, Performance and Risk*
- *Infrastructure resilience*

Specific Assumption Reference:

- Substation Condition Rebuild/Replacement
 - Age/condition of structural components
- Substation/line equipment limits
- System Performance Projects Global Factors
 - System reliability and performance

Problem Statement:

- Existing copper conductor on All Dam 6 – Kittanning 138 kV Line is nearing end of life, with multiple repairs and evidence of damage.
- All Dam 6 – Kittanning 138 kV Line has been in service since 1924.
- The line is 6.5 miles in length with approximately 6 miles of copper conductor.
- Attachment points are exhibiting extensive wear from conductor movement.
- Existing All Dam 6 – Kittanning 138 kV Line and conductor rating:
 - 148 / 151 / 166 / 166 MVA (SN/SE/WN/WE)



Need Numbers: APS-2023-077

Process State: Need Meeting 11/17/2023

Project Driver:

- *Equipment Material Condition, Performance and Risk*
- *Infrastructure resilience*

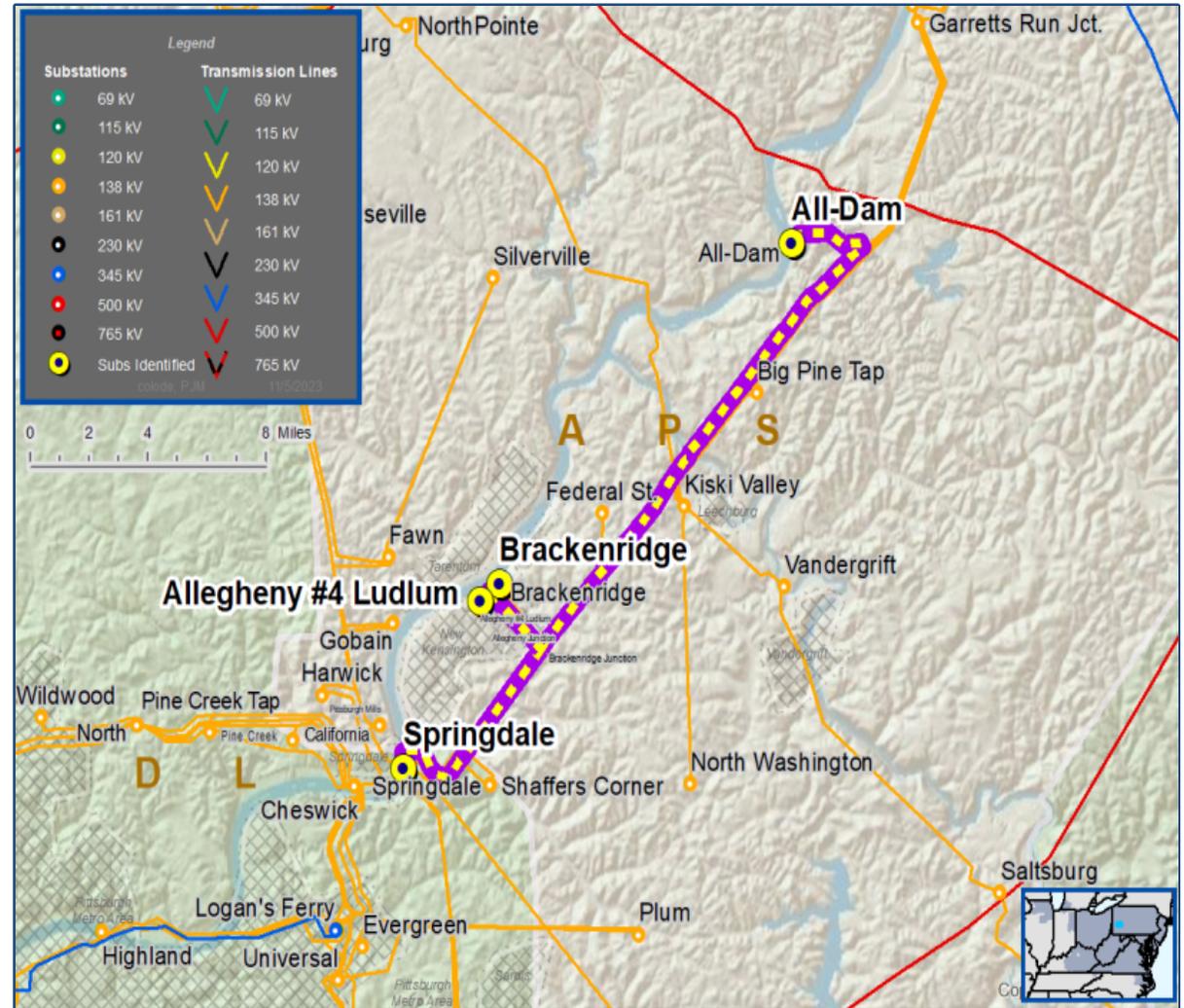
Specific Assumption Reference:

- Substation Condition Rebuild/Replacement
 - Age/condition of structural components
- Substation/line equipment limits
- System Performance Projects Global Factors
 - System reliability and performance

Problem Statement:

- Existing copper conductor on All Dam 6 – Brackenridge – Springdale 138 kV Line is nearing end of life, with multiple repairs and evidence of damage.
- All Dam 6 – Brackenridge – Springdale 138 kV Line has been in service since 1923.
- Attachment points are exhibiting extensive wear from conductor movement.
- The line is approximately 20 miles in length with approximately 7 miles of copper conductor.

Continued on next slide...





APS Transmission Zone M-3 Process
All Dam 6 – Brackenridge – Springdale 138 kV Line

Need #	Transmission Line / Substation Locations	Existing Line Rating (SN / SE)	Existing Conductor Rating (SN / SE)
APS-2023-077	All Dam 6 – All Ludlum 4 JCT 138 kV	148 / 151	148 / 151
	All Ludlum 4 JCT – Springdale 138 kV	292 / 306	297 / 365
	All Ludlum 4 JCT – Brackenridge 138 kV	278 / 339	278 / 339

Need Numbers: APS-2023-078

Process State: Need Meeting 11/17/2023

Project Driver:

- *Equipment Material Condition, Performance and Risk*
- *Infrastructure resilience*

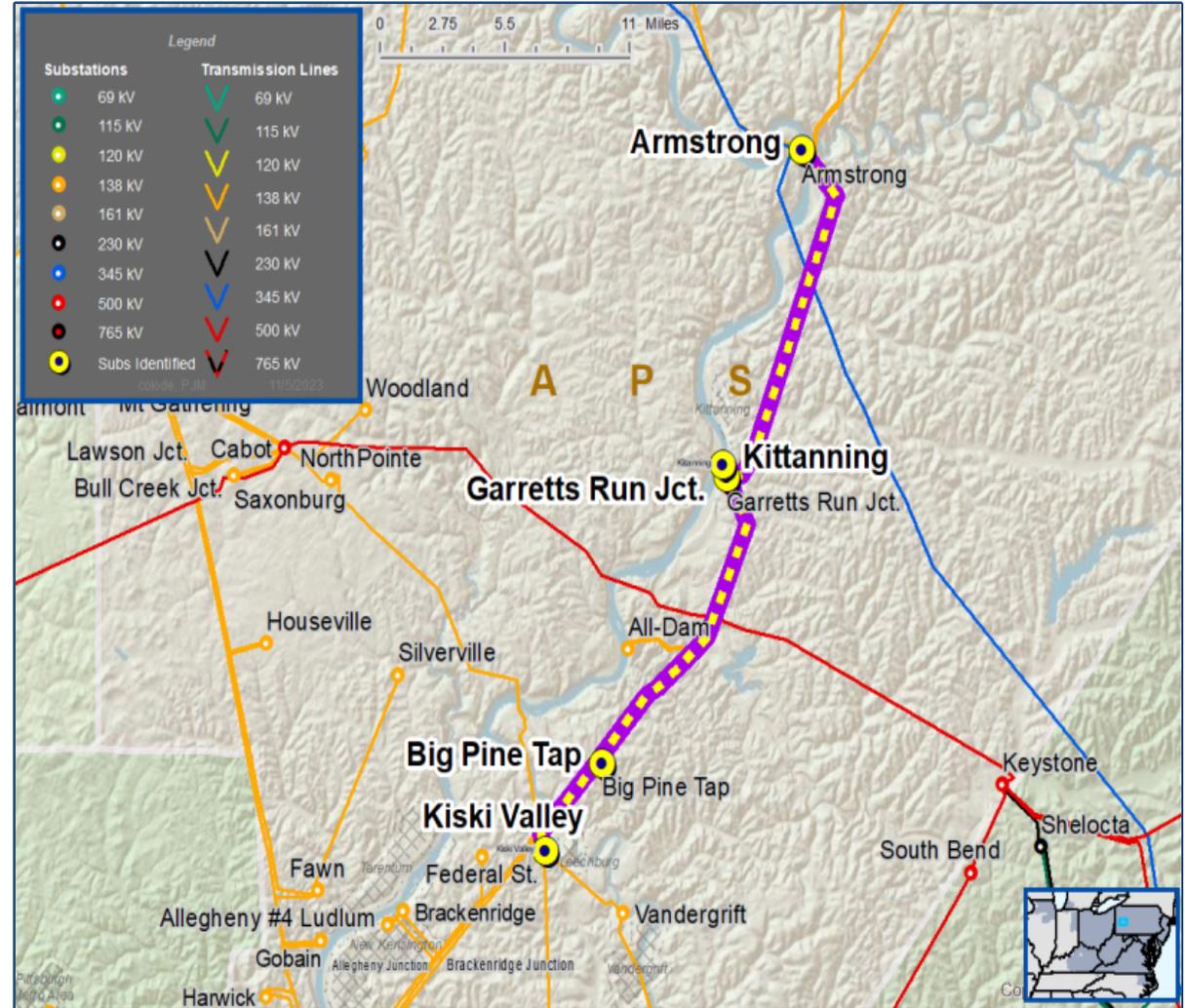
Specific Assumption Reference:

- Substation Condition Rebuild/Replacement
 - Age/condition of structural components
- Substation/line equipment limits
- System Performance Projects Global Factors
 - System reliability and performance

Problem Statement:

- Existing conductor on Armstrong – Kiski Valley – Kittanning 138 kV Line is nearing end of life, with multiple repairs and evidence of damage.
- Armstrong – Kiski Valley – Kittanning 138 kV (Garretts Run Junction) Line has been in service since 1957.
- Attachment points are exhibiting extensive wear from conductor movement.
- The line is approximately 26 miles in length with approximately 13 miles of copper conductor.

Continued on next slide...





APS Transmission Zone M-3 Process Armstrong – Kiski Valley – Kittanning 138 kV Line

Need #	Transmission Line / Substation Locations	Existing Line Rating (SN / SE)	Existing Conductor Rating (SN / SE)
APS-2023-078	Armstrong – Garretts Run JCT 138 kV	308 / 376	308 / 376
	Garretts Run JCT – Kittanning 138 kV	300 / 358	308 / 376
	Kiski Valley – Columbia Big Pine 138 kV	148 / 151	148 / 151
	Columbia Big Pine – Garretts Run JCT 138 kV	148 / 151	148 / 151

Solutions

Stakeholders must submit any comments within 10 days of this meeting in order to provide time necessary to consider these comments prior to the next phase of the M-3 process

Need Numbers: APS-2023-036, APS-2023-041 to APS-2023-043, APS-2023-045 to APS-2023-049

Process Stage: Solution Meeting 11/17/2023

Previously Presented: Need Meeting 10/20/2023

Project Driver:

Equipment Material Condition, Performance and Risk

Specific Assumption Reference:

System Performance Projects Global Factors

- System reliability and performance
- Substation/line equipment limits

System Condition Projects

- Substation Condition Rebuild/Replacement

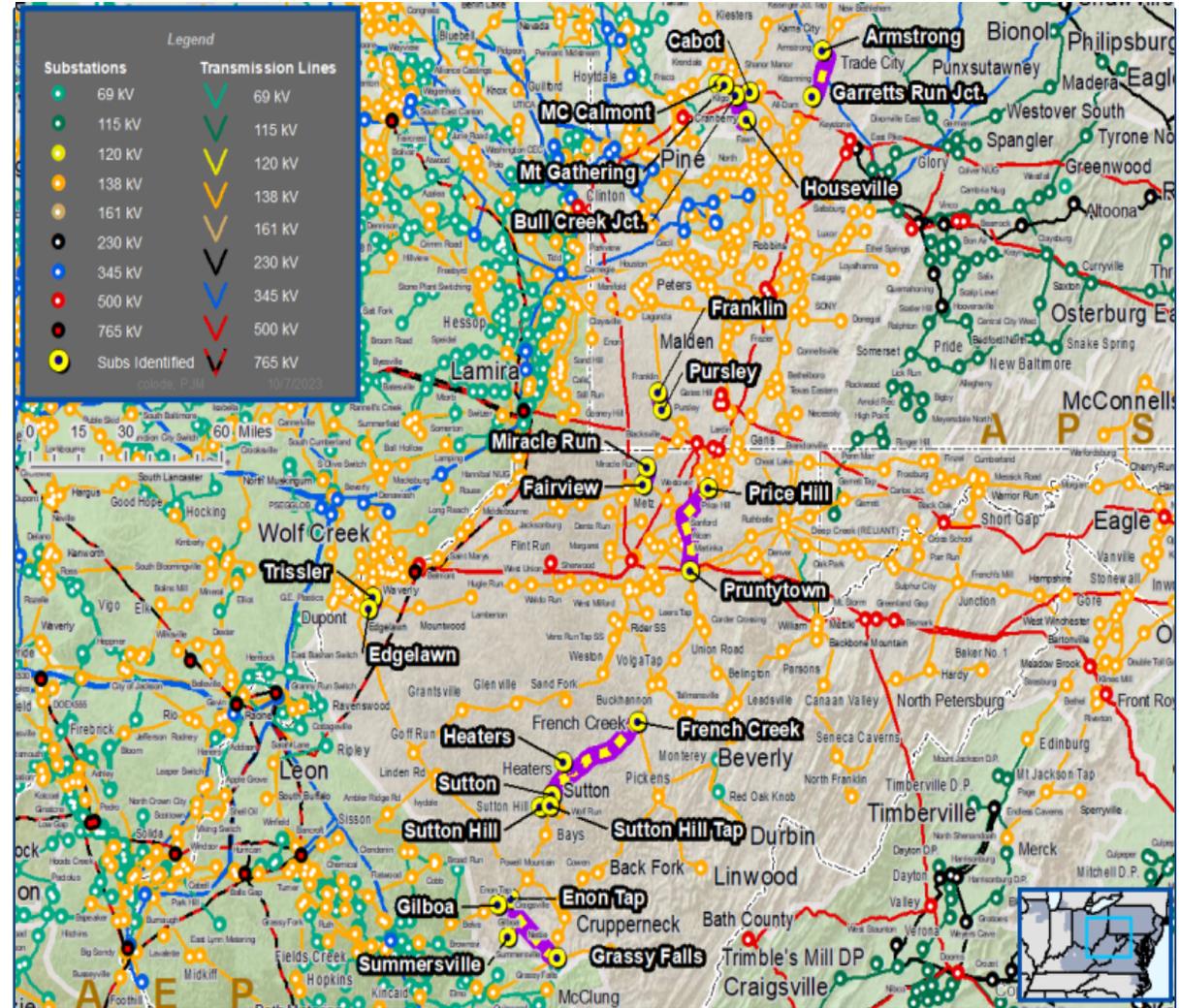
Upgrade Relay Schemes

- Obsolete and difficult to repair communication equipment (DTT, Blocking, etc.)
- Communication technology upgrades

Problem Statement:

- FirstEnergy has identified protection schemes using a certain vintage of relays and communication equipment that have a history of misoperation.
- Proper operation of the protection scheme requires all the separate components perform adequately during a fault.
- In many cases the protection equipment cannot be repaired due to a lack of replacement parts and available expertise in the outdated technology.
- Transmission line ratings are limited by terminal equipment.

Continued on next slide...





APS Transmission Zone M-3 Process Misoperation Relay Projects

Need #	Transmission Line / Substation Locations	Existing Line Rating (SN / SE)	Existing Conductor Rating (SN / SE)
APS-2023-036	Franklin – Pursley 138 kV	287 / 314	308 / 376
APS-2023-041	Fairview – Miracle Run Tap 138 kV	175 / 228	308 / 376
APS-2023-042	Armstrong – Garretts Run Junction 138 kV	294 / 350	308 / 376
APS-2023-043	Trissler– Edgelawn 90 138 kV	225 / 295	308 / 376
APS-2023-045	Heaters Tap – Sutton 138 kV	97 / 105	107 / 128
APS-2023-046	Gilboa – 304 Junction 138 kV	229 / 229	278 / 339
	Grassy Falls – Summersville 138 kV	229 / 229	309 / 376
APS-2023-047	Price Hill – Pruntytown 138 kV	221 / 268	221 / 268
APS-2023-048	Cabot – Bull Creek Junction 138 kV	308 / 376	308 / 376
	Bull Creek Junction – Houseville 138 kV	294 / 350	297 / 365
	Mountain Gathering – McCalmont 138 kV	267 / 352	297 / 365
APS-2023-049	Sutton Hill Tap – Sutton 138 kV	85 / 105	85 / 106
	Sutton Hill Tap – Sutton Hill 138 kV	89 / 96	107 / 128



APS Transmission Zone M-3 Process Misoperation Relay Projects

Proposed Solution:

Need #	Transmission Line / Substation Locations	New MVA Line Rating (SN / SE)	Scope of Work	Estimated Cost	Target ISD
APS-2023-036	Franklin – Pursley 138 kV	308 / 376	<ul style="list-style-type: none"> At Franklin Substation, replace circuit breaker, disconnect switches, line trap, substation conductor and relaying At Pursley Substation, replace substation conductor and relaying 	\$2.2 M	11/29/2024
APS-2023-041	Fairview – Miracle Run Tap 138 kV	308 / 376	<ul style="list-style-type: none"> At Fairview Substation, replace circuit breaker, disconnect switches, substation conductor and relaying 	\$2.8 M	06/16/2023
APS-2023-042	Armstrong – Garretts Run Junction 138 kV	308 / 376	<ul style="list-style-type: none"> At Armstrong Substation, replace disconnect switches, substation conductor and relaying 	\$2.5 M	05/26/2023
APS-2023-043	Trissler– Edgelawn 90 138 kV	294 / 350	<ul style="list-style-type: none"> At Trissler Substation, replace wave trap, disconnect switches and relaying At Edgelawn Substation, replace circuit breaker, line trap and relaying 	\$3.3 M	12/01/2022
APS-2023-045	Heaters Tap – Sutton 138 kV	107 / 128	<ul style="list-style-type: none"> At Sutton Substation, replace line trap and relaying 	\$1.5 M	05/10/2024
APS-2023-046	Gilboa – 304 Junction 138 kV	278 / 339	<ul style="list-style-type: none"> At Gilboa Substation, replace circuit breaker, disconnect switches, line trap and relaying 	\$4.3 M	12/01/2023
	Grassy Falls – Summersville 138 kV	309 / 376	<ul style="list-style-type: none"> At Grassy Falls Substation, replace circuit breaker, disconnect switches, line trap and relaying 		

Proposed Solution:

Need #	Transmission Line / Substation Locations	New MVA Line Rating (SN / SE)	Scope of Work	Estimated Cost	Target ISD
APS-2023-047	Price Hill – Pruntytown 138 kV	221 / 268	<ul style="list-style-type: none"> At Pruntytown Substation, replace line trap and relaying At Price Hill Substation, replace line trap and relaying 	\$2.3 M	12/19/2023
APS-2023-048	Cabot – Bull Creek Junction 138 kV	308 / 376	<ul style="list-style-type: none"> At Cabot Substation, replace circuit breakers, disconnect switches, substation conductor and relaying 	\$5.3 M	12/15/2023
	Bull Creek Junction – Houseville 138 kV	297 / 365	<ul style="list-style-type: none"> At Houseville Substation, replace circuit breaker, disconnect switches, substation conductor and relaying 		
	Mountain Gathering – McCalmont 138 kV	297 / 365	<ul style="list-style-type: none"> At McCalmont Substation, replace circuit breaker, disconnect switches, line trap, substation conductor and relaying 		
APS-2023-049	Sutton Hill T – Sutton 138 kV	85 / 106	<ul style="list-style-type: none"> At Sutton Substation, replace circuit breaker, line trap and relaying 	\$1.8 M	01/29/2024

Alternatives Considered: Maintain equipment in existing condition and risk of misoperation of protective relays.

Project Status: In construction/Engineering

Model: 2023 RTEP model for 2028 Summer (50/50)

Need Numbers: APS-2023-051

Process Stage: Solution Meeting 11/17/2023

Previously Presented: Need Meeting 10/20/2023

Project Driver:

- *Equipment Material Condition*
- *Performance and Risk*
- *Infrastructure resilience*

Specific Assumption Reference:

- Substation Condition Rebuild/Replacement
 - Age/condition of structural components
- System Performance Projects Global Factors
 - System reliability and performance

Problem Statement:

- Existing switches at Cumberland Substation are beyond reliable operation.
 - Severe alignment issues result in improper closures, requiring a hammer to manually close, resulting in a safety issues
 - Switch mounting insulators often break during this process, resulting in live parts falling, creating a potential for accidents and system faults.

The Short Gap – Cumberland 138 kV Line is limited by substation conductor

- Existing line rating:
 - 299/358/349/410 MVA (SN/SE/WN/WE)
- Existing conductor rating:
 - 308/376/349/445 MVA (SN/SE/WN/WE)

Short Gap



Legend	
500 kV	
345 kV	
230 kV	
138 kV	
115 kV	
69 kV	
46 kV	
34.5 kV	
23 kV	
New	

Need Number: APS-2023-051

Process Stage: Solution Meeting 11/17/2023

Proposed Solution:

- At Cumberland Substation:
 - Replace conductor and disconnect switches on Short Gap 138 kV line terminal

Transmission Line Ratings:

- Cumberland – Short Gap 138 kV Line:
 - Before Proposed Solution: 299 / 358 / 349 / 410 MVA (SN / SE / WN / WE)
 - After Proposed Solution: 299 / 360 / 349 / 422 MVA (SN / SE / WN / WE)

Alternatives Considered:

- Maintain existing condition with risk of switch not operating properly when needed.

Estimated Project Cost: \$ 0.4 M

Projected In-Service: 12/31/2023

Project Status: Construction

Model: 2023 RTEP model for 2028 Summer (50/50)

Short Gap



Legend	
500 kV	
345 kV	
230 kV	
138 kV	
115 kV	
69 kV	
46 kV	
34.5 kV	
23 kV	
New	

Appendix

High Level M-3 Meeting Schedule

Assumptions	Activity	Timing
	Posting of TO Assumptions Meeting information	20 days before Assumptions Meeting
	Stakeholder comments	10 days after Assumptions Meeting
Needs	Activity	Timing
	TOs and Stakeholders Post Needs Meeting slides	10 days before Needs Meeting
	Stakeholder comments	10 days after Needs Meeting
Solutions	Activity	Timing
	TOs and Stakeholders Post Solutions Meeting slides	10 days before Solutions Meeting
	Stakeholder comments	10 days after Solutions Meeting
Submission of Supplemental Projects & Local Plan	Activity	Timing
	Do No Harm (DNH) analysis for selected solution	Prior to posting selected solution
	Post selected solution(s)	Following completion of DNH analysis
	Stakeholder comments	10 days prior to Local Plan Submission for integration into RTEP
	Local Plan submitted to PJM for integration into RTEP	Following review and consideration of comments received after posting of selected solutions

Revision History

11/7/2023 – V1 – Original version posted to pjm.com

11/9/2023 –V2 – Updated map for APS-2023-051