INSTRUMENTATION PLANNING AND USE AT A SASKATCHEWAN MINE

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INSTRUMENTATION PLANNING AND USE AT A SASKATCHEWAN MINE

- UPSTREAM DYKE CONSTRUCTION
- FINE TAILINGS CELL OPERATIONS
- COARSE TAILINGS PILE OPERATIONS
- TAKE AWAYS
- QUESTIONS

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USE OF INSTRUMENTATION IN UPSTREAM DYKE CONSTRUCTION

- UPSTREAM DYKE CONSTRUCTION
- UNDERSTANDING CRITICAL SLOPE STABILITY MECHANISM
- PLANNING INSTRUMENTATION
- MODELING
- FIELD IMPLEMENTATION

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USE OF INSTRUMENTATION IN UPSTREAM DYKE CONSTRUCTION

- UPSTREAM DYKE CONSTRUCTION
- FINE TAILINGS DEPOSITED WITHIN CELL
- DYKE RAISE CONSTRUCTED OVER FINE TAILINGS
- BUILDUP OF EXCESS PORE WATER PRESSURE

(photograph not taken in SK)

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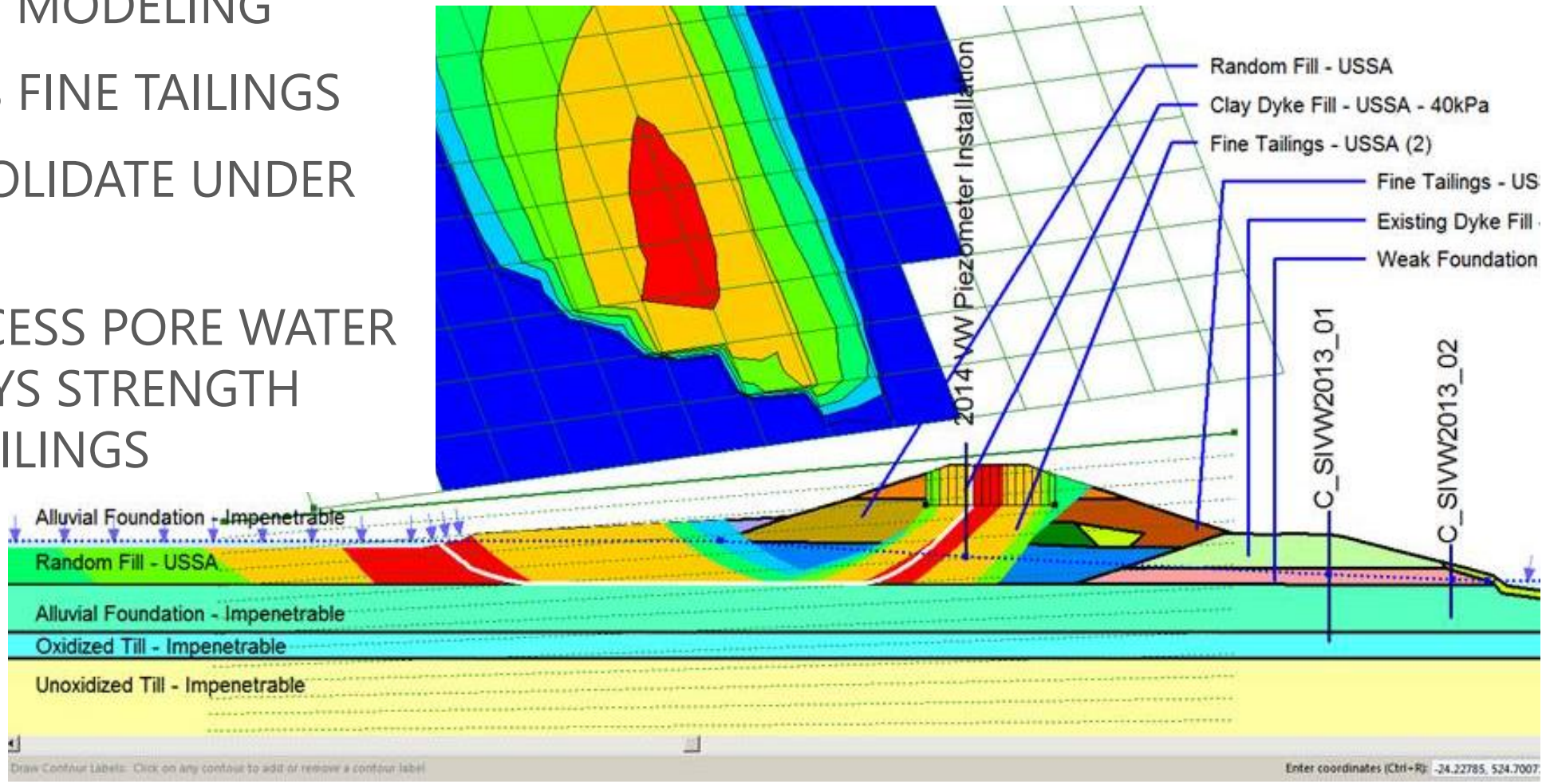
USE OF INSTRUMENTATION IN UPSTREAM DYKE CONSTRUCTION

- SLOPE STABILITY MODELING
- CRITICAL SOIL IS FINE TAILINGS
- TAILINGS CONSOLIDATE UNDER DYKE FILL
- BUILDUP OF EXCESS PORE WATER PRESSURE DELAYS STRENGTH GAIN IN FINE TAILINGS



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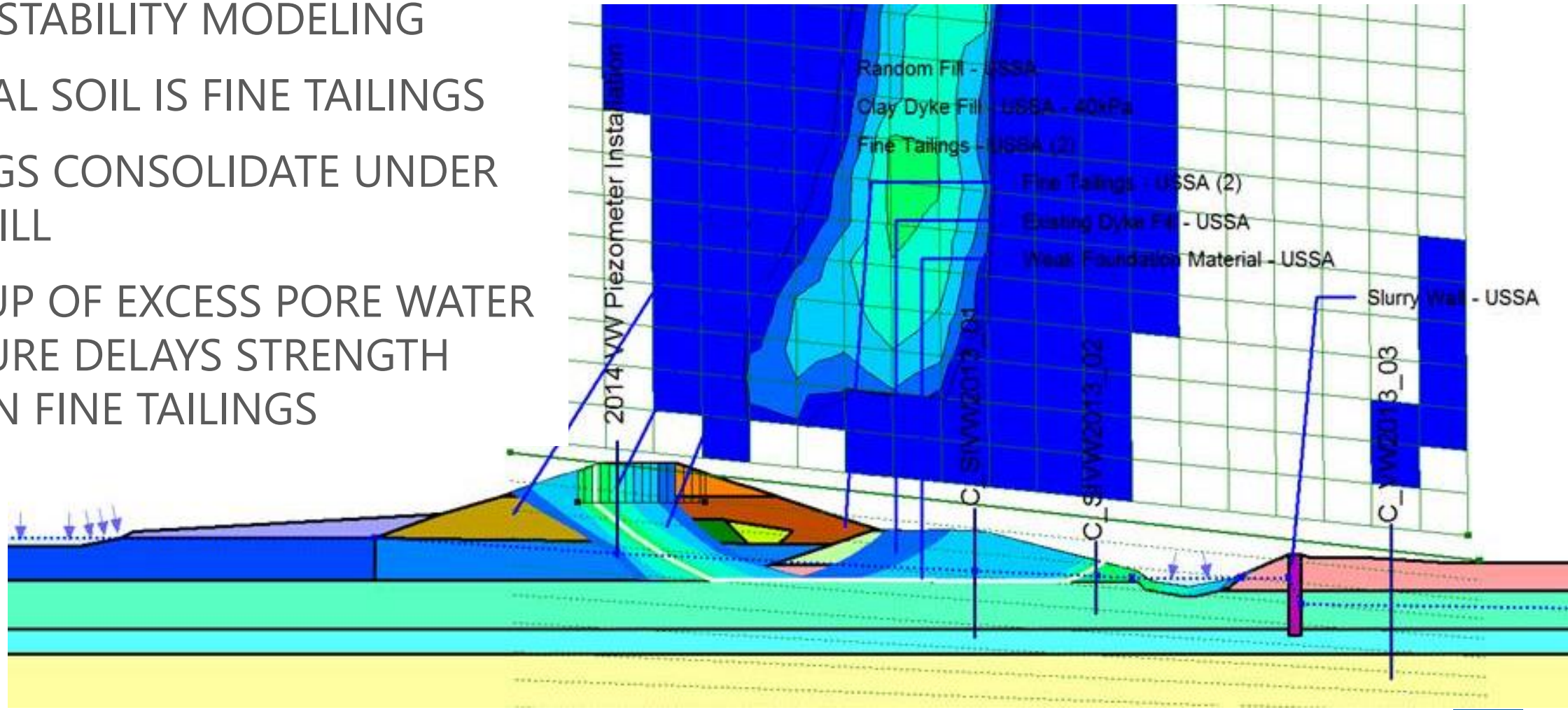

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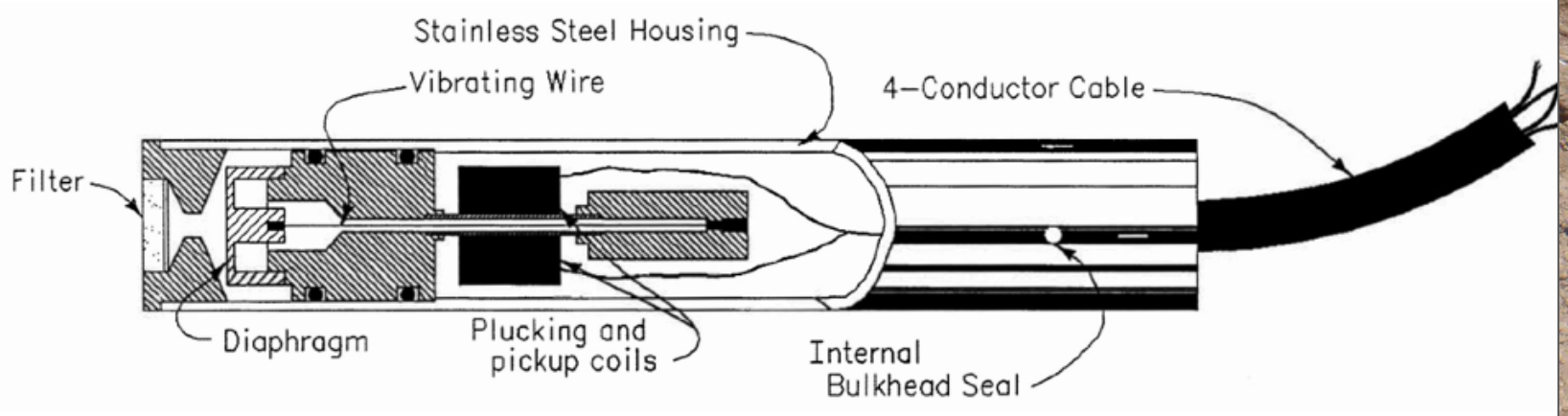
USE OF INSTRUMENTATION IN UPSTREAM DYKE CONSTRUCTION

- INSTALL INSTRUMENTATION IN CRITICAL SOILS
- VIBRATING WIRE PIEZOMETERS MEASURE PORE WATER PRESSURE
- DATALOGGERS RECORD PRESSURES AUTOMATICALLY. REVIEW FREQUENTLY



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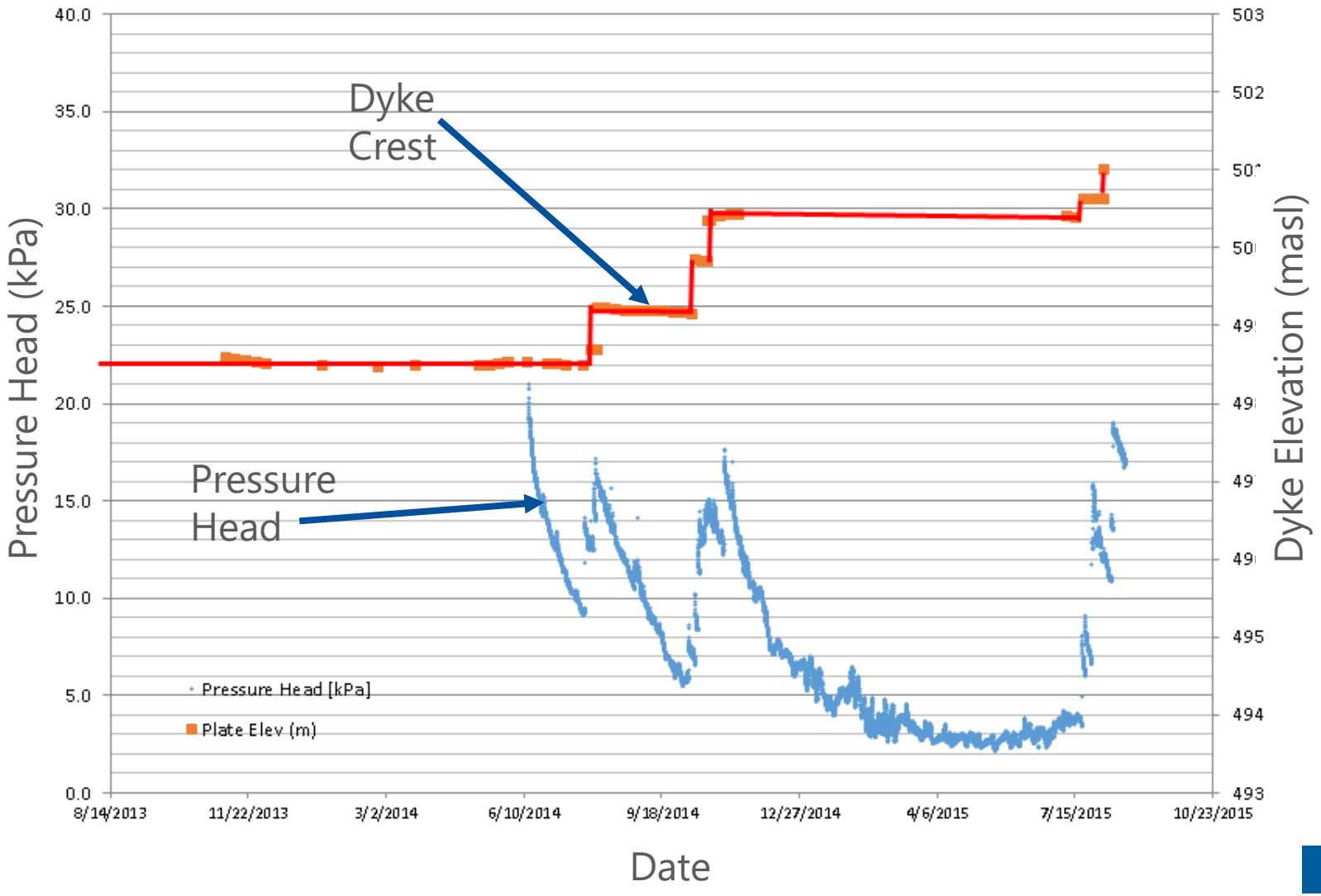
USE OF INSTRUMENTATION IN UPSTREAM DYKE CONSTRUCTION

- B-BAR METHOD USED TO ESTIMATE EXCESS PORE WATER PRESSURE GENERATION AND DISSIPATION
- ACCOUNTS FOR SOME DISSIPATION BETWEEN PLACEMENT OF EACH LIFT OF FILL
- USED TO DEVELOP ACTION LEVELS FOR EACH PIEZOMETER



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USE OF INSTRUMENTATION IN UPSTREAM DYKE CONSTRUCTION

- REAL LIFE CONDITIONS ARE MORE COMPLEX THAN MODELS
- ITERATIVE APPROACH BASED ON INSTRUMENTATION DATA
- FOS RECALCULATED FOR CRITICAL AREAS BASED ON SPATIAL DISTRIBUTION OF TOTAL HEAD

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USE OF INSTRUMENTATION IN FINE TAILINGS CELL OPERATIONS

- FINE TAILINGS DEPOSITED BY SPIGOT
- NEARBY DEPOSITION CAN TEMPORARILY INCREASE THE PORE WATER PRESSURES WITHIN THE DYKE
- ACTION LEVELS DEVELOPED DURING DESIGN USED TO GUIDE OPERATIONS
- UPDATE ACTION LEVELS AS MORE DATA BECOMES AVAILABLE DURING CELL OPERATION

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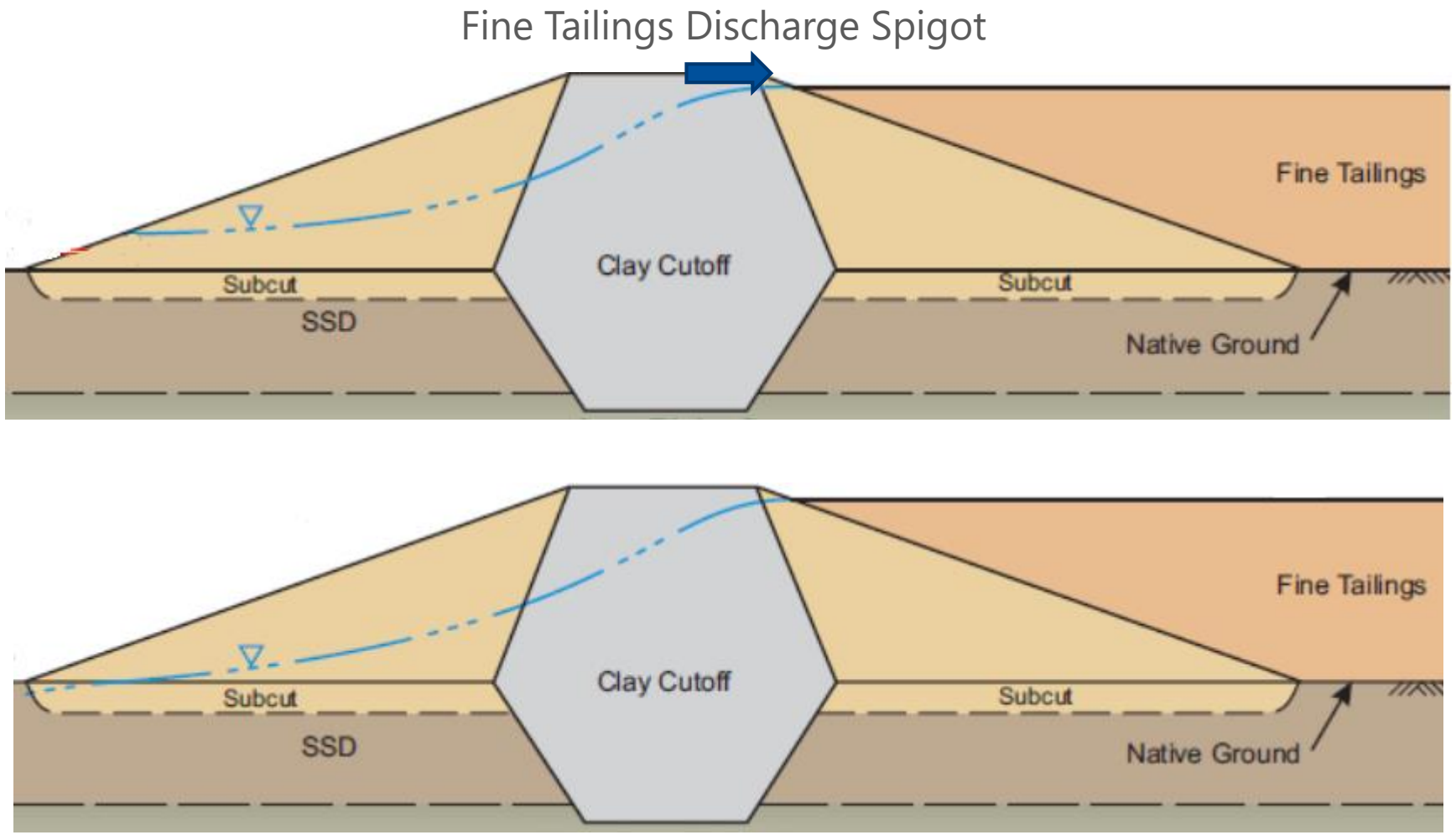
USE OF INSTRUMENTATION IN FINE TAILINGS CELL OPERATIONS

- SLURRY DEPOSITION CAN RAISE PHREATIC SURFACE WITHIN ADJACENT DYKE
- INCREASE IN PORE WATER PRESSURES RESULTS IN DECREASE OF FACTOR OF SAFETY OF DYKE
- BECOMES MORE CRITICAL AS YOU REACH CELL CAPACITY



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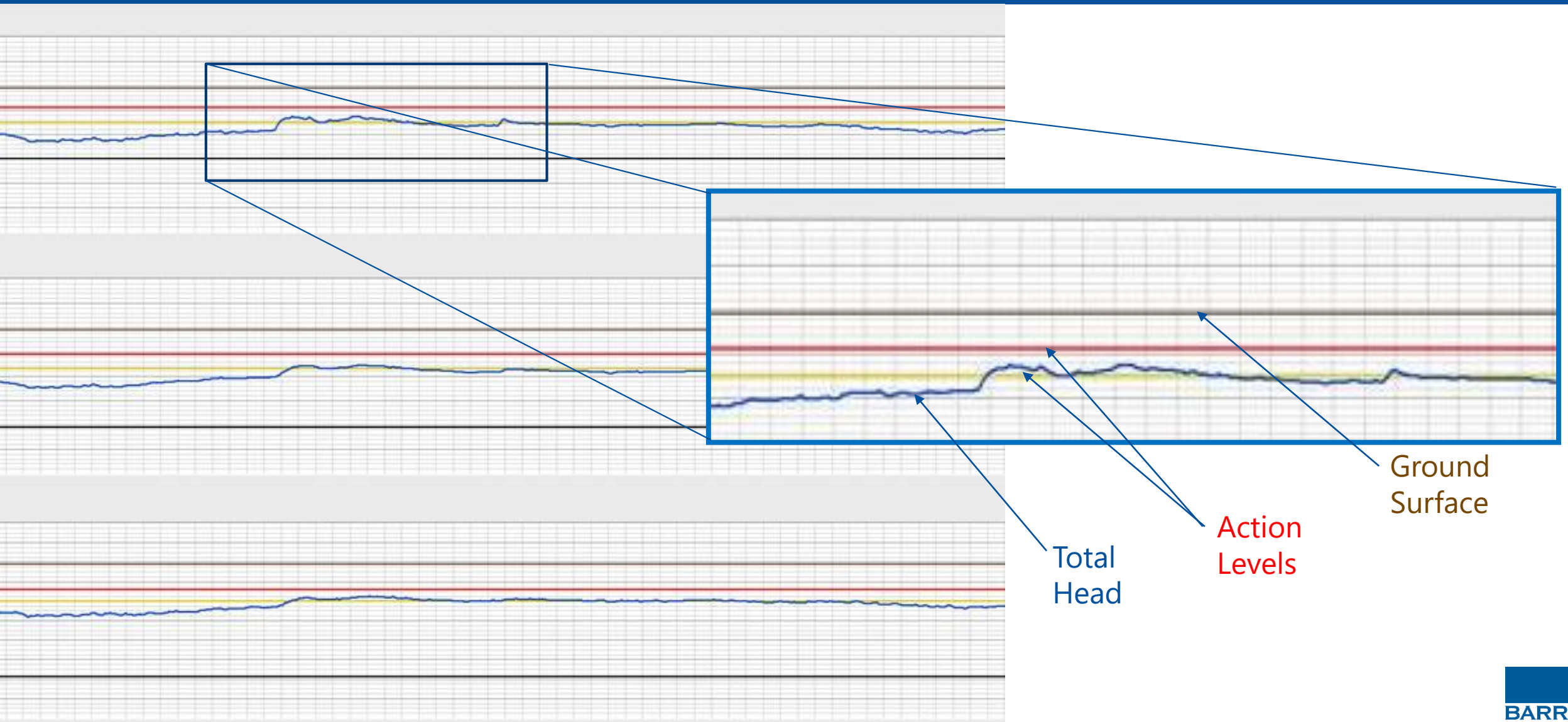
USE OF INSTRUMENTATION IN FINE TAILINGS CELL OPERATIONS



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USE OF INSTRUMENTATION IN COARSE TAILINGS PILE OPERATIONS

- PIEZOMETERS AND INCLINOMETERS USED TO MONITOR PILE STABILITY
- UNDERSTAND PORE WATER PRESSURE IN SALT AND FOUNDATION SOILS
- MONITOR FOR ACTUAL MOVEMENT AT CRITICAL LOCATIONS

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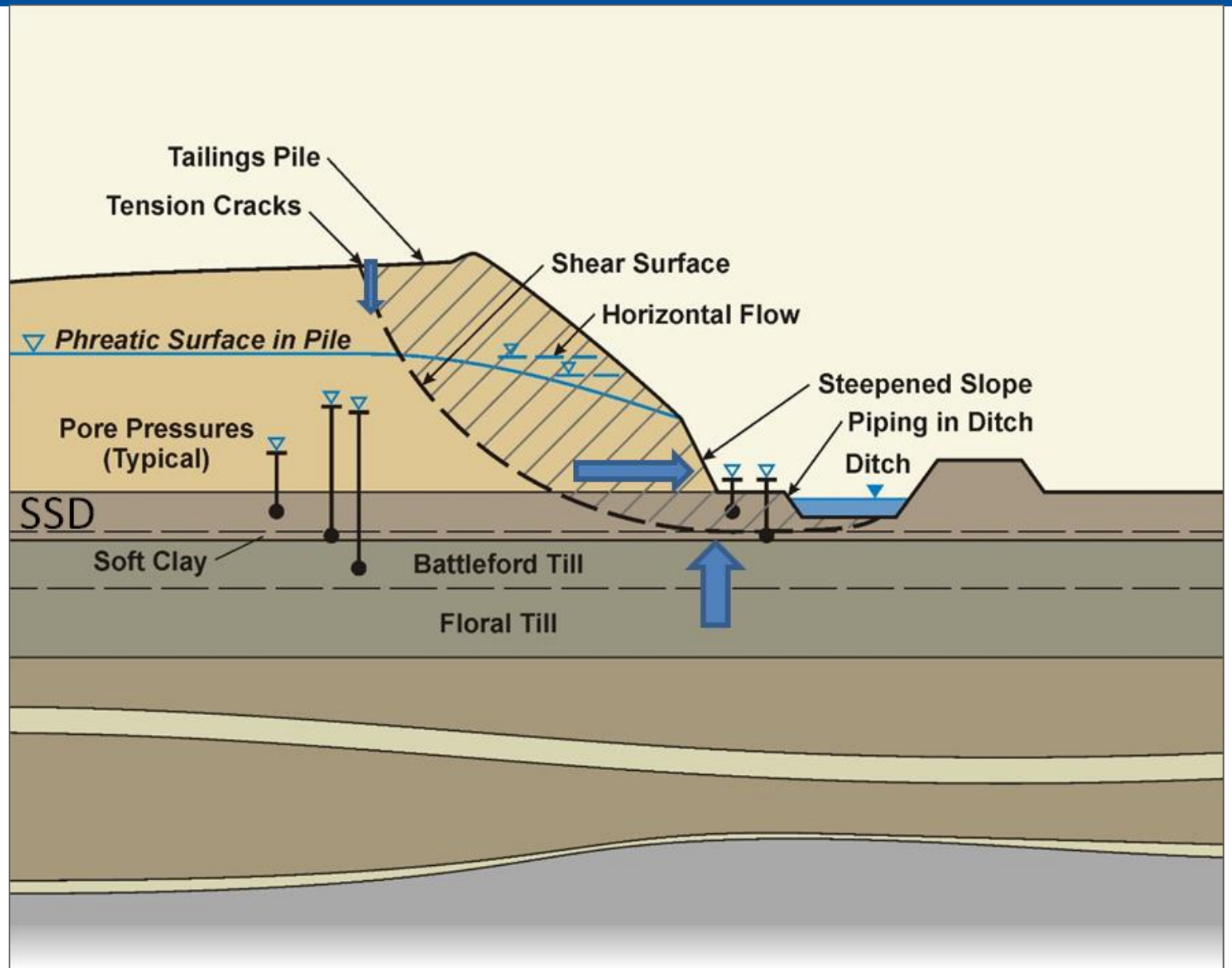
USE OF INSTRUMENTATION IN COARSE TAILINGS PILE OPERATIONS

- PORE WATER PRESSURES IN SALT AND FOUNDATION SOILS ARE IMPORTANT FOR PILE STABILITY
- CONSOLIDATION OF FOUNDATION SOILS CAN LEAD TO EXCESS PORE WATER PRESSURE



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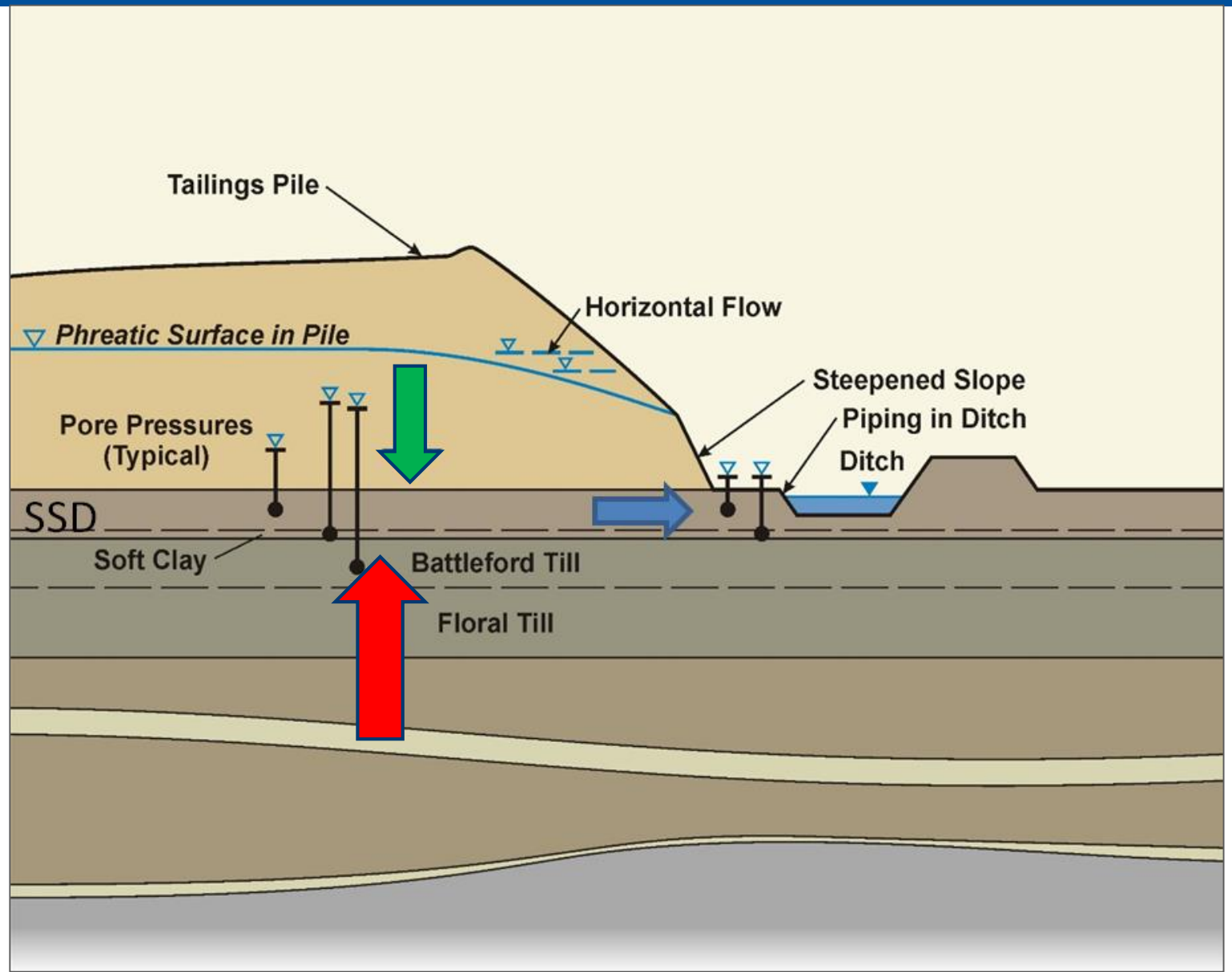
USE OF INSTRUMENTATION IN COARSE TAILINGS PILE OPERATIONS

- INCREASE IN BRINE MOUND DECREASES STABILITY
- INCREASE IN PORE WATER PRESSURE IN FOUNDATION SOILS DECREASES STABILITY
- UNDERSTAND OVERALL FLOW REGIME



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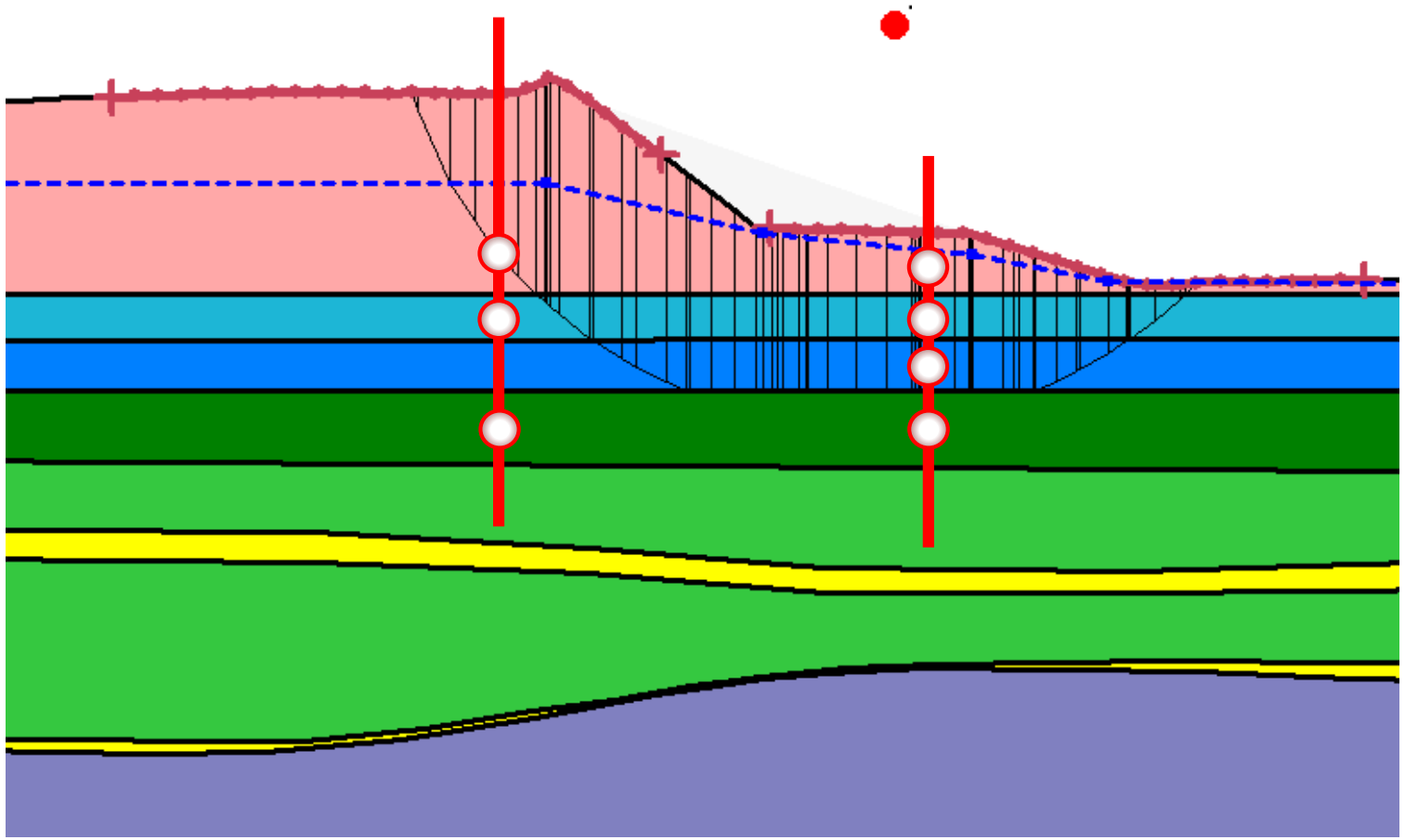
USE OF INSTRUMENTATION IN COARSE TAILINGS PILE OPERATIONS

- ACTION LEVELS USED TO INFLUENCE COARSE TAILINGS DEPOSITION LOCATIONS
- INSTRUMENTATION PROVIDES THE DATA NEEDED TO HELP EVALUATE THE FACTOR OF SAFETY



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TAKE-AWAYS – UPSTREAM DYKE CONSTRUCTION

- IMPORTANT TO MONITOR BOTH FILL AND FINE TAILINGS
- USE DATA TO VERIFY EFFECTIVE STRESS PROFILE
- IF CONSTRUCTION TIMELINE IS LIMITED, MONITORING AND STRENGTH DATA ARE CRITICAL

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TAKE-AWAYS – FINE TAILINGS CELL OPERATIONS

- CONSIDER OPERATIONS WHEN PLANNING INSTRUMENATION
- OPERATIONS CAN INFLUENCE THE FOS OF DYKES
- ACTION LEVELS SHOULD BE REVIEWED TO VERIFY DESIGN ASSUMPTIONS

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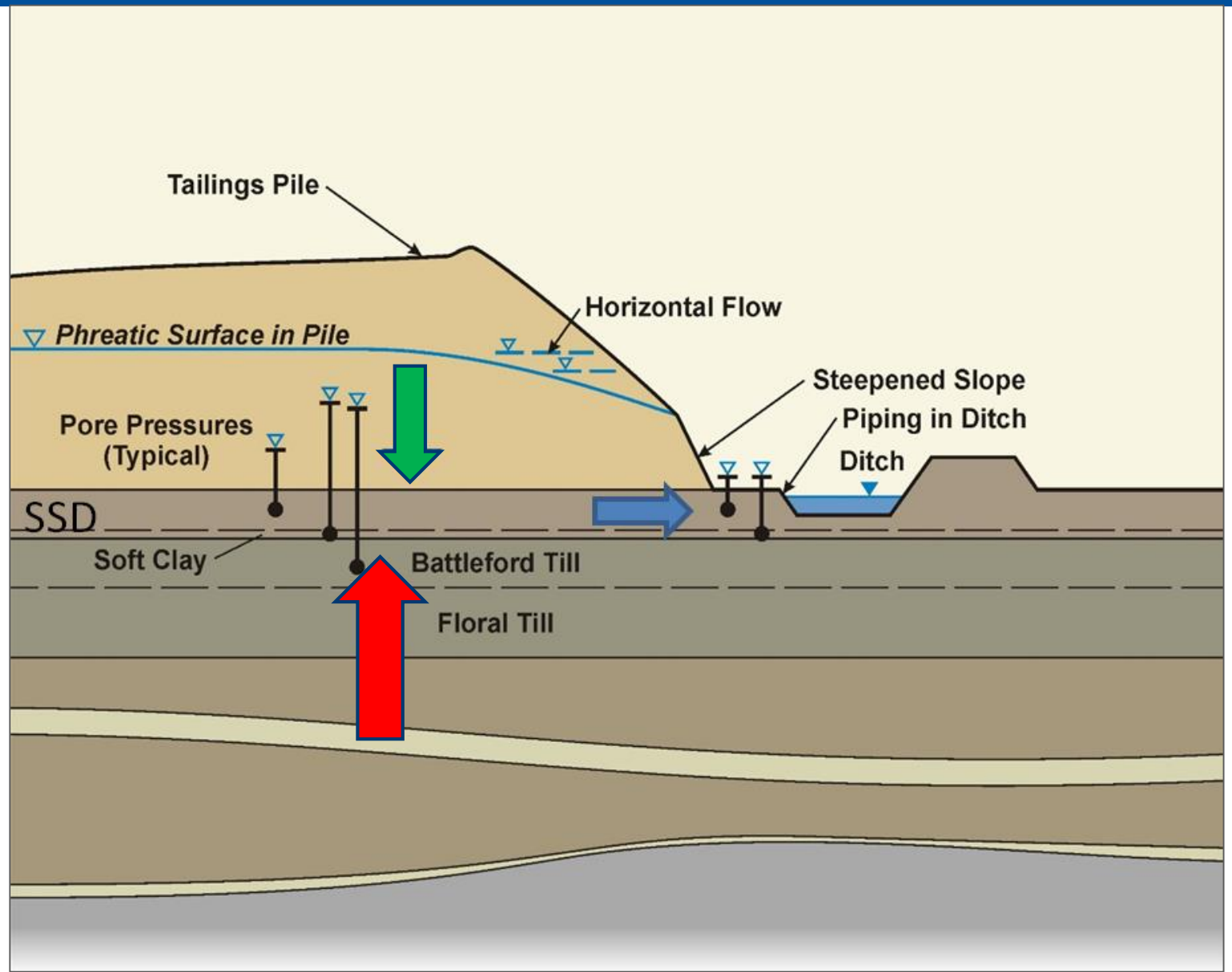
TAKE-AWAYS – COARSE TAILINGS PILE OPERATIONS

- IMPORTANT TO MONITOR PORE WATER PRESSURE OF SALT AND FOUNDATION SOILS
- WATCH FOR EXCESS PORE WATER PRESSURE IN FOUNDATION SOILS
- CONSIDER LIMITATIONS OF INSTRUMENATION



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INSTRUMENTATION - QUESTIONS AND COMMENTS

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