Based on the given assurance case pattern, we can instantiate an assurance case for the BlueROV2 system. First, we will instantiate placeholders with concrete information relevant to the BlueROV2 system and then display the assurance case in a hierarchical tree format using dashes (-) to denote different levels.

### Instantiated Assurance Case for BlueROV2 System

- \*\*G1: Hazards for BlueROV2 system addressed in accordance with ALARP principle.\*\*

- \*\*S1: Argument by risk reduction/elimination of each hazard\*\*

- \*\*G2: No intolerable risks present in the system.\*\*

- \*\*C1: Definition of "intolerable"\*\*

- \*\*S2: Argue that risk posed by any remaining hazards is negligible\*\* (undeveloped)

- \*\*S3: Argue that no other risks have been identified\*\* (undeveloped)

- \*\*G3: Risk from hazard "Deviation from the operating area" has been reduced as low as reasonably practicable\*\*

- \*\*C2: Assigned severity class is Minor\*\*

- \*\*S4: Apply ReSonAte to estimate level of risk from hazard condition "Deviation from the operating area"\*\*

- \*\*A1: Function "command authority" required by "Deviation from Operating Area" BTD is available\*\*

- \*\*G4: Model "Deviation from Operating Area BTD" accurately describes possible propagation of hazard "Deviation from the operating area"\*\* (uninstantiated)

- \*\*G6: Possible hazard propagation paths correctly captured in BTD\*\* (undeveloped)

- \*\*G7: Barriers in the BTD correctly describe their respective control action including any required system functions\*\* (undeveloped)

- \*\*G8: All non-negligible threats have been identified\*\* (undeveloped)

- \*\*G5: Quantitative risk estimates are accurate and below the acceptable threshold\*\*

- \*\*G9: State probability distribution used for risk estimation is an accurate representation of expected system states\*\* (undeveloped)

- \*\*G10: Estimated probability of collision is below allowable threshold for severity class\*\*

- \*\*Sn1: Estimated risk level 10^-3 per hour\*\*

- \*\*G3: Risk from hazard "Obstacle Encounter" has been reduced as low as reasonably practicable\*\*

- \*\*C2: Assigned severity class is Major\*\*

- \*\*S4: Apply ReSonAte to estimate level of risk from hazard condition "Obstacle Encounter"\*\*

- \*\*A1: Function "obstacle detection" required by "Obstacle Encounter" BTD is available\*\*

- \*\*G4: Model "Obstacle Encounter BTD" accurately describes possible propagation of hazard "Obstacle Encounter"\*\* (uninstantiated)

- \*\*G6: Possible hazard propagation paths correctly captured in BTD\*\* (undeveloped)

- \*\*G7: Barriers in the BTD correctly describe their respective control action including any required system functions\*\* (undeveloped)

- \*\*G8: All non-negligible threats have been identified\*\* (undeveloped)

- \*\*G5: Quantitative risk estimates are accurate and below the acceptable threshold\*\*

- \*\*G9: State probability distribution used for risk estimation is an accurate representation of expected system states\*\* (undeveloped)

- \*\*G10: Estimated probability of collision is below allowable threshold for severity class\*\*

- \*\*Sn1: Estimated risk level 10^-3 per hour\*\*

- \*\*G3: Risk from hazard "Loss of pipeline" has been reduced as low as reasonably practicable\*\*

- \*\*C2: Assigned severity class is Minor\*\*

- \*\*S4: Apply ReSonAte to estimate level of risk from hazard condition "Loss of pipeline"\*\*

- \*\*A1: Function "avoidance logic" required by "Loss of pipeline" BTD is available\*\*

- \*\*G4: Model "Loss of pipeline BTD" accurately describes possible propagation of hazard "Loss of pipeline"\*\* (uninstantiated)

- \*\*G6: Possible hazard propagation paths correctly captured in BTD\*\* (undeveloped)

- \*\*G7: Barriers in the BTD correctly describe their respective control action including any required system functions\*\* (undeveloped)

- \*\*G8: All non-negligible threats have been identified\*\* (undeveloped)

- \*\*G5: Quantitative risk estimates are accurate and below the acceptable threshold\*\*

- \*\*G9: State probability distribution used for risk estimation is an accurate representation of expected system states\*\* (undeveloped)

- \*\*G10: Estimated probability of collision is below allowable threshold for severity class\*\*

- \*\*Sn1: Estimated risk level 10^-3 per hour\*\*

This hierarchical tree structure adheres to the provided predicates and transforms the assurance case pattern using the domain-specific BlueROV2 information. The undeveloped and uninstantiated sections indicate areas requiring further development tailored to BlueROV2 system requirements.