Based on the domain information of the GPCA system and the safety case pattern predicates, the instantiated safety case for the GPCA system would look like the following:

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- G1: Operational safety is verified in the GPCA system.

- S1: Argument over the satisfaction of all specs over the GPCA system. (Undeveloped)

- C1: All specs are given by spec.allInstances()

- G2: All operational hazards are mitigated.

- S3: Argument over operational hazards.

- C2: Operational hazards are given by operational\_hazard.allInstances()

- G3: Overinfusion is mitigated.

- S4: Argument over the applied scenarios of Overinfusion.

- C3: All related scenarios are given by Overinfusion

- G4: Overinfusion is mitigated under Flow rate mismatch scenario.

- S5: Argument over all specs related to Flow rate mismatch scenario.

- C4: All related specs are given by Flow\_rate\_mismatch.spec.allinstances()

- G5: Flow rate sensor spec is appropriate for Flow rate mismatch scenario.

- S6: Argument the appropriateness of Flow rate sensor spec over properties.

- C5: Properties are given by Flow\_rate\_sensor\_spec.property.allinstances()

- G6: Flow rate sensor is appropriate for Flow rate of 90% programmed setting.

- S7: Argument over the source of the property definition.

- C6: Source is given by property.source

- G7: Expert opinion.

- Sn1: Source - Expert opinion.

- G8: Flow rate is less than 90% of the programmed rate setting.

- Sn2: Property - Flow rate is less than 90% of the programmed rate setting.

- G5: Dose limit spec is appropriate for Excessive bolus requests scenario. (Undeveloped)

- G5: Bolus concentration spec is appropriate for Bolus volume/concentration too high scenario. (Undeveloped)

- G3: Underinfusion is mitigated. (Undeveloped)

- S4: Argument over the applied scenarios of Underinfusion.

- G4: Underinfusion is mitigated under Programmed rate too low scenario. (Undeveloped)

- G4: Underinfusion is mitigated under Flow rate mismatch scenario. (Undeveloped)

- S2: Argument over reliability in all suitable levels of the GPCA system. (Undeveloped)

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### Explanation

1. \*\*Top-Level Goal\*\*: The main goal is to verify operational safety in the GPCA system (G1).

2. \*\*Supporting Strategies & Contexts\*\*: Strategies and contexts under G1 include arguing over all system specs and reliability at various levels.

3. \*\*Operational Hazards\*\*: G2 addresses the mitigation of all operational hazards, with a supporting strategy (S3) that details the operational hazards.

4. \*\*Specific Hazards\*\*: For each hazard, such as Overinfusion (G3), a strategy (S4) outlines the scenarios applicable to the hazard.

5. \*\*Scenarios & Specifications\*\*: Each scenario associated with a hazard (G4) has corresponding specs (G5) deemed appropriate.

6. \*\*Properties Verification\*\*: For each spec, an argument (S6) is developed regarding the appropriateness of the properties (G6).

7. \*\*Sources & Definitions\*\*: Sources of the property definitions (G7) are evaluated for appropriateness, and the properties themselves are checked for sufficiency (G8).

Note that some of the goals and strategies are kept undeveloped to indicate areas where further details and arguments are necessary. These correspond to elements that were marked as undeveloped or requiring more information in the provided pattern.