Based on the provided safety case pattern and domain information for the GPCA system, here is the instantiated safety case:

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G1: Operational safety is verified in GPCA system

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

S1: Argument over the satisfaction of all specs over {system}

G2: All operational hazards are mitigated

S3: Argument over operational hazards

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

G3.1: Overinfusion is mitigated

S4.1: Argument over the applied scenarios of Overinfusion

C3.1: All related scenarios are given by Overinfusion

G4.1.1: Overinfusion is mitigated under scenario 1

S5.1.1: Argument over all specs related to scenario 1

C4.1.1: All related specs are given by scenario 1.spec.allInstances()

G5.1.1.1: spec 1 is appropriate for scenario 1

S6.1.1.1: Argument the appropriateness of spec 1 over properties

C5.1.1.1: Properties are given by spec 1.property.allInstances()

G6.1.1.1.1: "Flow rate sensor is equipped" is appropriate for spec 1

S7.1.1.1.1: Argument over the source of the "Flow rate sensor is equipped" definition

C6.1.1.1.1: Source is given by "Flow rate sensor is equipped"

G7.1.1.1.1.1: Source for "Flow rate sensor is equipped" is appropriate and trustworthy

Sn1.1: FDA standard

G8.1.1.1.1.2: "Flow rate sensor is equipped" definition is sufficient

Sn2.1: Property "Flow rate sensor is equipped"

G4.1.2: Overinfusion is mitigated under scenario 2

S5.1.2: Argument over all specs related to scenario 2

C4.1.2: All related specs are given by scenario 2.spec.allInstances()

G5.1.2.1: spec 2 is appropriate for scenario 2

S6.1.2.1: Argument the appropriateness of spec 2 over properties

C5.1.2.1: Properties are given by spec 2.property.allInstances()

G6.1.2.1.1: "Dose limit exceeded due to excessive bolus requests" is appropriate for spec 2

S7.1.2.1.1: Argument over the source of the "Dose limit exceeded due to excessive bolus requests" definition

C6.1.2.1.1: Source is given by "Dose limit exceeded due to excessive bolus requests"

G7.1.2.1.1.1: Source for "Dose limit exceeded due to excessive bolus requests" is appropriate and trustworthy

Sn1.2: Expertise opinion

G8.1.2.1.1.2: "Dose limit exceeded due to excessive bolus requests" definition is sufficient

Sn2.2: Property "Dose limit exceeded due to excessive bolus requests"

G3.2: Underinfusion is mitigated

S4.2: Argument over the applied scenarios of Underinfusion

C3.2: All related scenarios are given by Underinfusion

G4.2.1: Underinfusion is mitigated under scenario 1

S5.2.1: Argument over all specs related to scenario 1

C4.2.1: All related specs are given by scenario 1.spec.allInstances()

G5.2.1.1: spec 3 is appropriate for scenario 1

S6.2.1.1: Argument the appropriateness of spec 3 over properties

C5.2.1.1: Properties are given by spec 3.property.allInstances()

G6.2.1.1.1: "Period (to trigger the underinfusion alarm) is 15 minutes" is appropriate for spec 3

S7.2.1.1.1: Argument over the source of the "Period (to trigger the underinfusion alarm) is 15 minutes" definition

C6.2.1.1.1: Source is given by "Period (to trigger the underinfusion alarm) is 15 minutes"

G7.2.1.1.1.1: Source for "Period (to trigger the underinfusion alarm) is 15 minutes" is appropriate and trustworthy

Sn1.3: Previous knowledge

G8.2.1.1.1.2: "Period (to trigger the underinfusion alarm) is 15 minutes" definition is sufficient

Sn2.3: Property "Period (to trigger the underinfusion alarm) is 15 minutes"

G4.2.2: Underinfusion is mitigated under scenario 2

S5.2.2: Argument over all specs related to scenario 2

C4.2.2: All related specs are given by scenario 2.spec.allInstances()

G5.2.2.1: spec 4 is appropriate for scenario 2

S6.2.2.1: Argument the appropriateness of spec 4 over properties

C5.2.2.1: Properties are given by spec 4.property.allInstances()

G6.2.2.1.1: "Flow rate is less than 90% of the programmed rate setting" is appropriate for spec 4

S7.2.2.1.1: Argument over the source of the "Flow rate is less than 90% of the programmed rate setting" definition

C6.2.2.1.1: Source is given by "Flow rate is less than 90% of the programmed rate setting"

G7.2.2.1.1.1: Source for "Flow rate is less than 90% of the programmed rate setting" is appropriate and trustworthy

Sn1.4: Expertise opinion

G8.2.2.1.1.2: "Flow rate is less than 90% of the programmed rate setting" definition is sufficient

Sn2.4: Property "Flow rate is less than 90% of the programmed rate setting"

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