



Longwall Hydraulics Hazards Workshop

Inoxihp Australia
Presents
Isolation Concepts



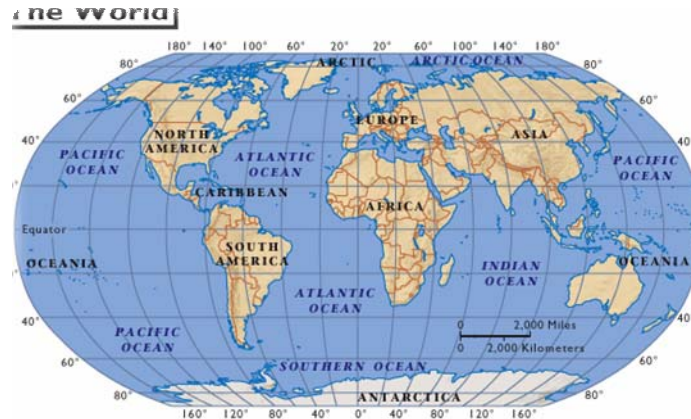
Presented By

Tim Leeson

General Manager for Inoxihp Australia

Inoxihp Australia

The design house for underground applications of Inoxihp products World wide.



Inoxihp: Italian Manufacturer of Positive Displacement Plunger Pumps & Valves designed exclusively for Water & Water Based Fluids

Input Power Range 75-450kW
Individual Pump Flows to 1000lpm
Pressure to 500 Bar

250kW 5 CYLINDER PUMP,
Single & Dual Variants

- NEW 450Kw 5 CYLINDER PUMP





How Much Safe Isolation Data Out There?

Google 'Isolation Procedures' World Wide

3,370,000 Hits

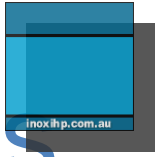
Australia produces 868,000 hits – 25%

The Top 3 documents All Produced in Australia

First Line of the first document

(Monash University):

'The purpose of these procedures is to ensure the isolation of unsafe machinery/equipment from potential uncontrolled energy sources during repair, service or maintenance work'



How Many Hydraulic Incidents

Google 'Hydraulic Injuries'
989,000 hits World Wide

Australia produces 48,300 hits

Or 18 documents per incident

Compared with 3 Documents per incident
Rest of the World

Designing for Isolation in Longwall Hydraulic Systems

1. Determine the reason for isolation
2. Identify the energy source(s)
3. Determine where to isolate
4. How to isolate
5. Assess safety of isolation

Designing for Isolation in Longwall Hydraulic Systems

1: Reason for isolation defined in Monash Uni document:

Repair, service & maintenance, but we also have **re-location** of Longwall equipment = regular & repeated operation = familiarity breeds contempt = mistakes.



Designing for Isolation in Longwall Hydraulic Systems

Conclusion:

Isolation needs to be simple, easy, positive.

Designing for Isolation in Longwall Hydraulic Systems

2: Energy Source:

Pressurized fluid from –

- **PUMPS**
- **SYSTEM ACCUMULATORS**
- **HOSES**
- **CYLINDERS – INTENSIFICATION
(ROOF SUPPORTS, TENSIONING
SYSTEMS etc)**

Designing for Isolation in Longwall Hydraulic Systems

3: Where to Isolate:

Logically-

- **PUMPS**
- **SYSTEM ACCUMULATORS**
- **HOSES**
- **CYLINDERS**

Designing for Isolation in Longwall Hydraulic Systems

4: How to Isolate:

- **Isolate from incoming energy**
- **Dissipate Energy trapped by Isolator**
- **Prevent re-generation from pump or cylinder intensification**

Designing for Isolation in Longwall Hydraulic Systems

5: Assessing safety of isolation chosen:

- **Where possible have isolated equipment open to atmosphere**
- **If isolation cannot be vented to atmosphere ensure pressure relief valve is fitted**
- **Ideally provide mechanical latch with lock, not rely on the lock alone.**



EXAMPLES OF CURRENT ISOLATION DESIGNS FOR PUMP- STATIONS, HP DELIVERY & ROOF SUPPORT SYSTEMS

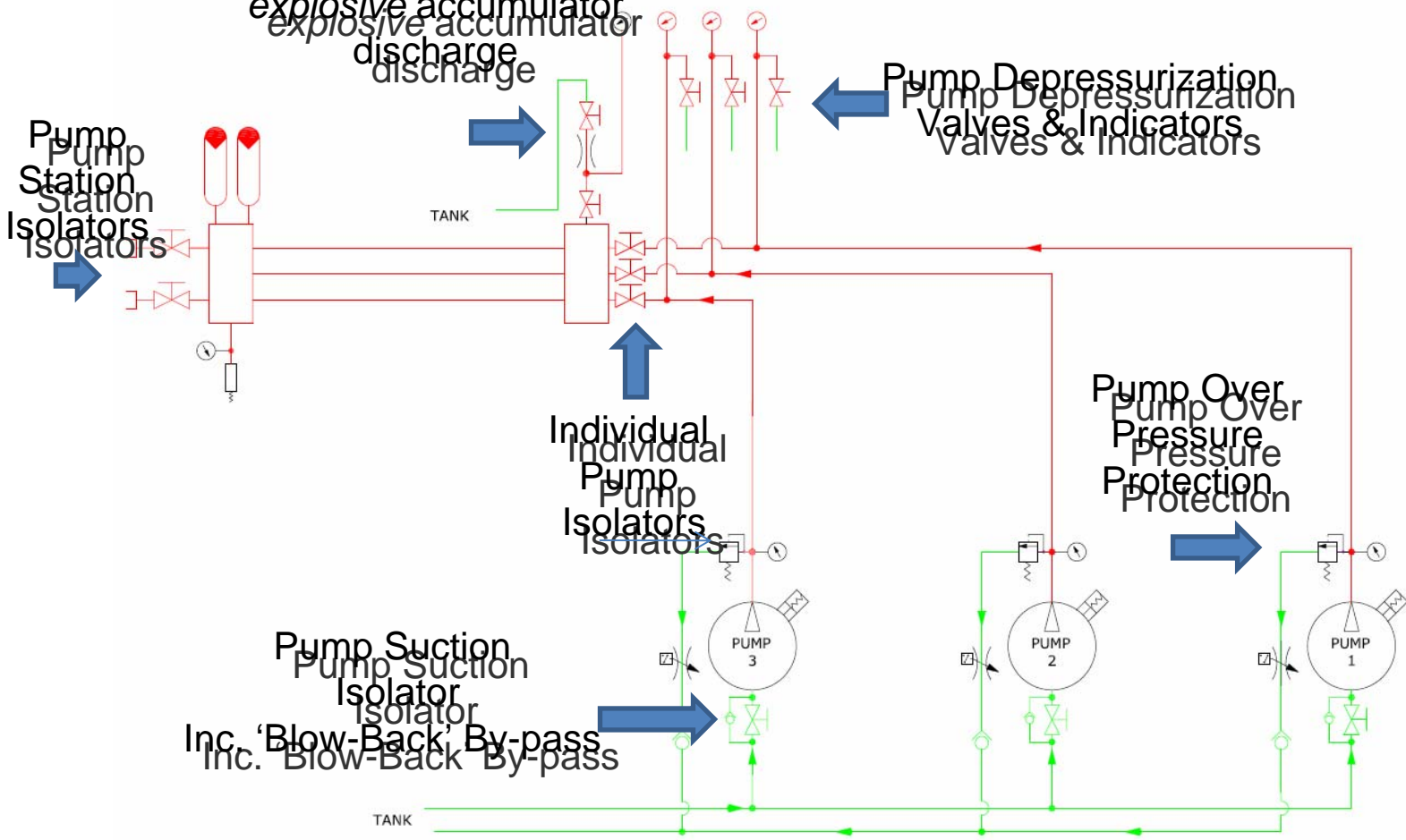
ISOLATING PUMPS & SYSTEM ACCUMULATORS

Multiple Pump Hydraulic Circuit

Inoxihp Control System Produces Low Risk Circuit

System Depressurization
Via OTU preventing
explosive accumulator
discharge

With NO Pulse Accumulators & No return line attenuators



Pump Suction Isolator
Inc. 'Blow-Back' By-pass

Individual Pump Isolators

Pump Over Pressure Protection

Pump Depressurization Valves & Indicators

Pump Station Isolators

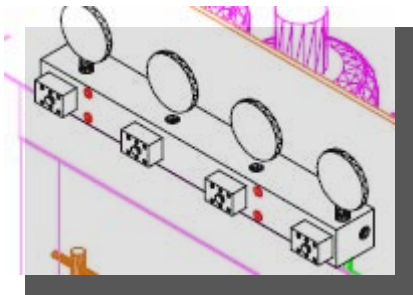
ISOLATING PUMPS & SYSTEM ACCUMULATORS

We start with the simplest control
system no demand = no flow

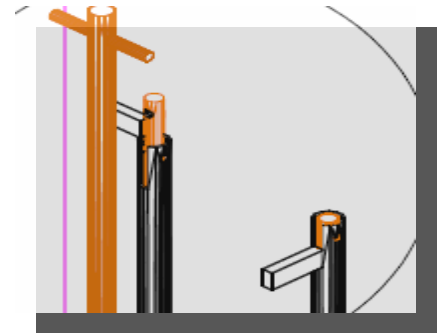
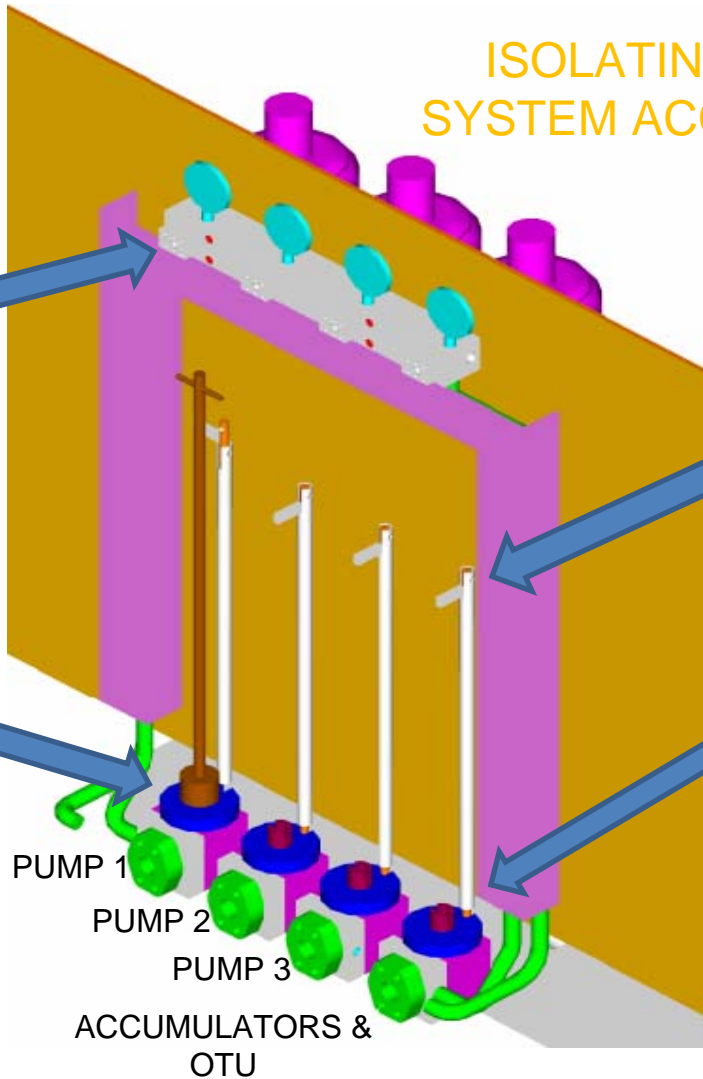
Inoxihp Pump cylinders are controlled
individually to create a flow on
demand system.



ISOLATING PUMPS & SYSTEM ACCUMULATORS

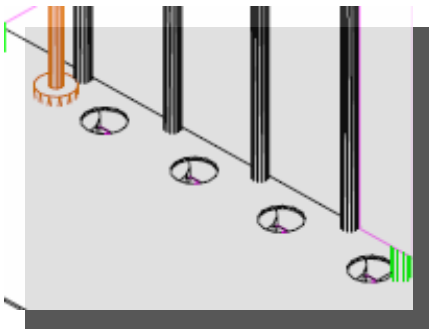


DEPRESSURIZATION VALVES WITH VISUAL INDICATORS & CLEAR LABELS

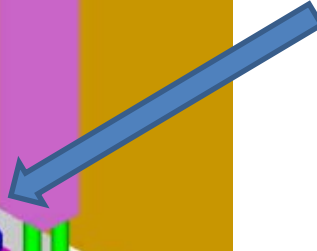


LOCK & FLAG SYSTEM PROVIDES INDICATOR & OPERATION OBSTRUCTION

ISOLATION VALVE ACCESS THROUGH FLOOR PLATE

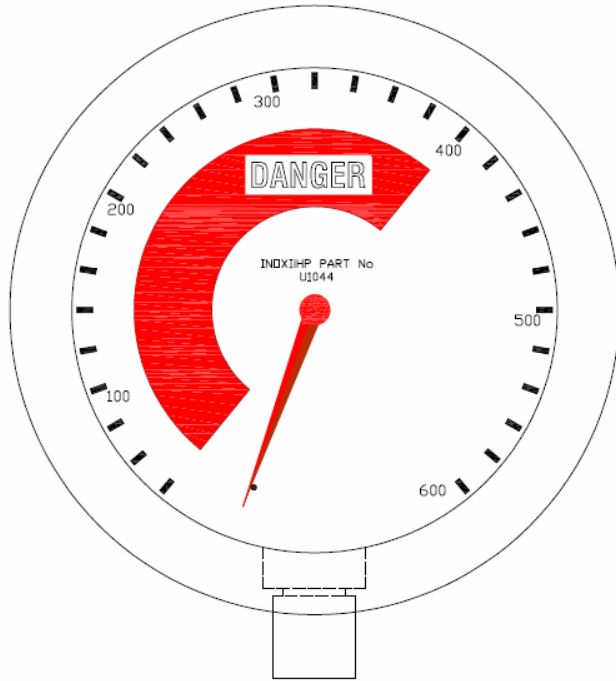


UNDER-FLOOR LATCHING SYSTEM REMOVES LOAD FROM VALVE SPINDLE



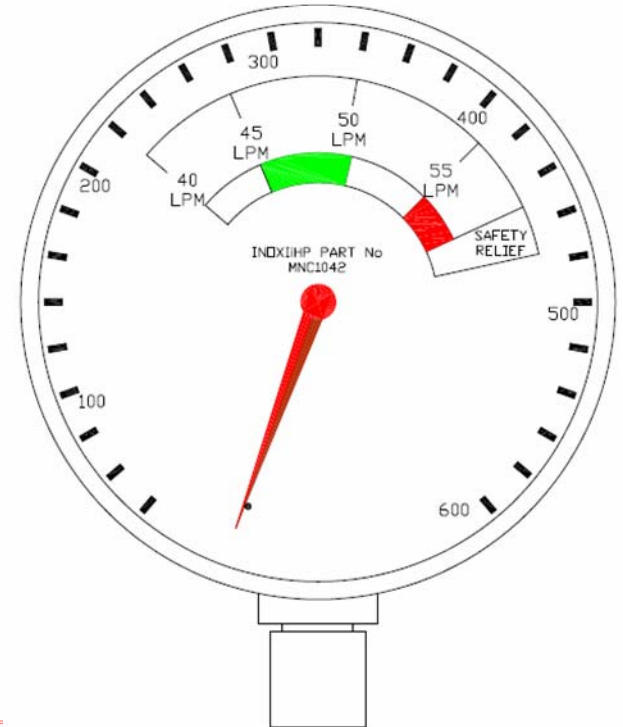
Multiple Pump & System Accumulator Isolation & De-pressurization Panel

ISOLATING PUMPS & SYSTEM ACCUMULATORS



GRADUATIONS:
RED : 0-400 BAR

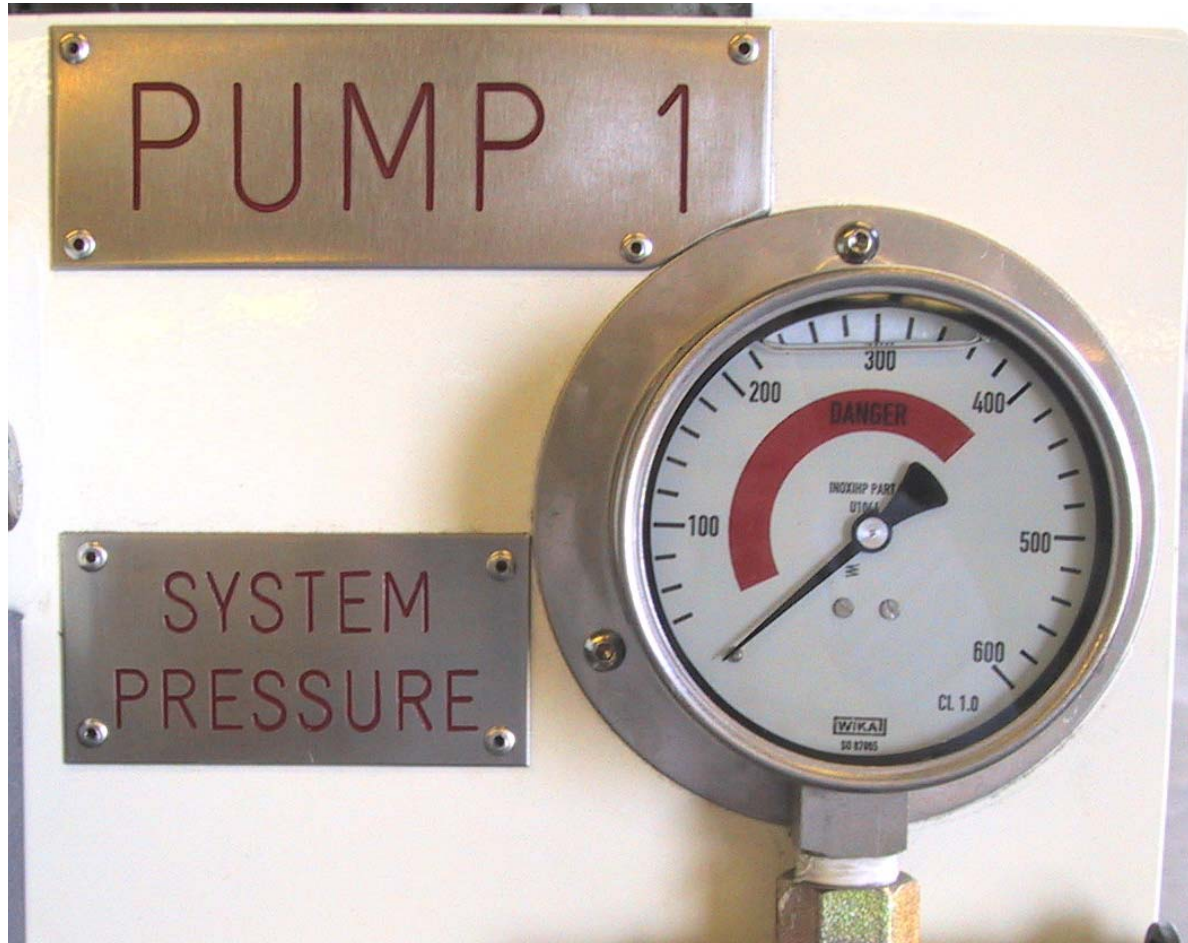
100mm FLANGE MOUNTED GAUGE, ENTRY AT
BOTTOM,
GLYCERINE FILLED, DRIFICE SNUBBED,
NO EXTERNAL ALUMINIUM CONTENT



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DRAWN: TTL	TITLE: U1044	2004	
DATE: 15/06/2009	DESCRIPTION: U1044	ULAN EMULSION PUMPS DEPRESSURIZING GAUGE	
APPROVED: Tim Lession	DWG NUMBER: U1044	REVISION: A	A3
1:500 ANGLE		SEE CHANGE HISTORY SHEET FOR DIMENSION DETAILS (SHEET 1 OF 1)	

Visual Indicators Include :
Informative Gauge Faces

ISOLATING PUMPS & SYSTEM ACCUMULATORS



De-pressurization Panel Gauge
& Clear Labeling

ISOLATING HOSES



- Hoses present unique problems for isolation with their ability to store energy in similar fashion to accumulators.
- Expansion of HP hose can be as much as 4% but typically around 2% at working pressure.
- For Example 2 x 40mm HP Hoses Hanging on the monorail will typically stand with 2.5kW of stored energy

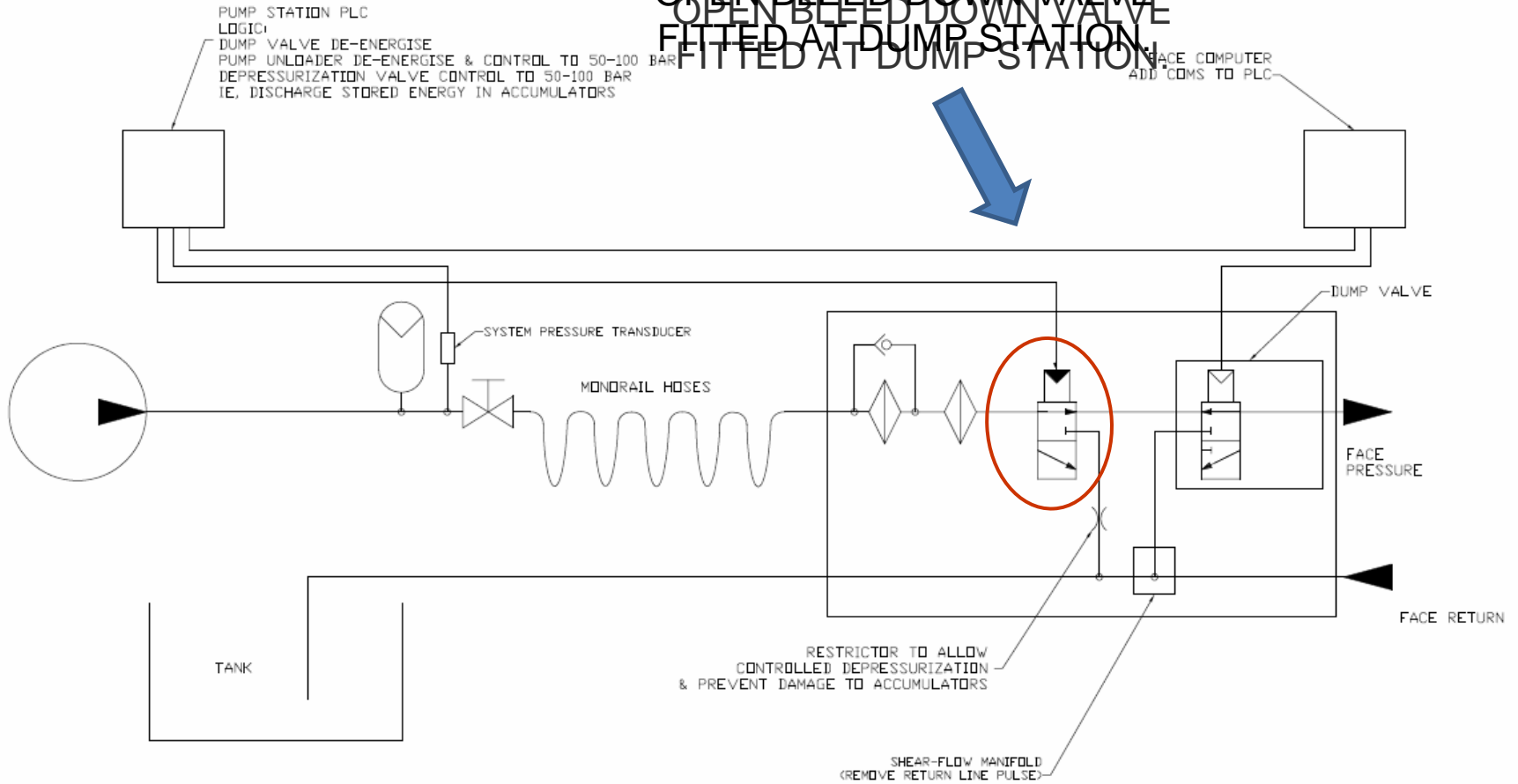
ISOLATING HOSES



- Monorail hoses have stored energy including pumpstation accumulators and the pump potential when the dump valve is operated.
- We offer a system to reduce the energy, remove the system accumulators and pumps from the potential.

ISOLATING HOSES

PLC CONTROLLED NORMALLY
OPEN BLEED DOWN VALVE
FITTED AT DUMP STATION,



ISOLATING HOSES



Monorail System
Letdown Installed at
Ulan Mine



ISOLATING CYLINDERS



ISOLATING CYLINDERS – ROOF SUPPORTS,
TENSIONING CYLINDERS, PTO'S,

SINGLE POINT - SINGLE FUNCTION - INTUITIVE



ISOLATING CYLINDERS



1. CLOSES PRESSURE FEED,
2. OPEN SERVICE PRESSURE TO RETURN
3. CLOSE RETURN
4. OPEN SERVICE PRESSURE & RETURN TO ATMOSPHERE



TO CONCLUDE OUR BRIEF LOOK AT ISOLATION CONCEPTS

Safe Isolation Should
Form Part of the OEM & User Agreed Design