

Tiered Isolation Procedure

(Energy Tag and Lockout)

Document number: PRO-02658

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NOTE – Seqwater have updated their processes and procedures that support Energy Tag and Lockout. This procedure is part of the suite of documents that replace the Energy Tag and Lockout Procedure (PRO-00014).

This new procedure takes effect from 2 November 2026.

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1. Purpose

The purpose of this Procedure is to describe out how Seqwater plans, implements, verifies, maintains and releases Tiered Isolations of hazardous energy at Seqwater sites, using the Ten Isolation Control Steps.

This Procedure must be read together with the Energy Tag and Lockout Standard ([BST-00004](#)). Where there is any inconsistency, the Standard takes precedence.

2. Scope

This Procedure applies to all employees and contractors performing Tiered Isolations on Seqwater's assets when a Complex isolation alone is not enough to safely control all interactions.

This Standard does not apply to Principal Contractors (PCs) however, they must still:

- follow Seqwater's Minimum Health, Safety and Environmental Requirements ([GDE-00368](#))
- meet or exceed the isolation standards established by this document and the controls established in Seqwater's Critical Controls Handbook ([MAN-00313](#))
- verify their processes are compatible with Seqwater's lock colours and interfaces to site permits and access controls.

Principal Contactor isolation processes must be confirmed during the contractor engagement and pre-start planning processes. Refer to Seqwater's Contractor Management Procedure (WHS, Env & DWQ) ([PRO-00808](#)) for further information.

3. Isolation Critical Controls

There are three critical controls relevant to Tiered Isolations:

1. Isolation of energy sources (excluding electrical)
2. Isolation of all low voltage electrical sources of energy
3. Isolation of all high voltage electrical sources

Refer to the Energy Tag and Lockout Standard ([BST-00004](#)) for details of the performance standards for each of these controls. Key aspects of these performance standards have been included in the Tiered Isolation Process outlined in section 5.2.

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4. What are Tiered Isolations

4.1. Key Concepts – Parent and Child Structure

For Tiered Isolation, Seqwater uses a parent / child model:

- **Parent (Master) Isolation(s)** – upstream isolations that protect multiple downstream sections or assets (e.g. trunk main or plant feed).
- **Child (Subordinate) isolation(s)** – downstream isolations that protect a specific section, asset or workplace.
- **Parent Lock Board (Master Board)** – holds the keys to master isolation locks. It is the “top” of the tiered structure.
- **Child Lock Board** – holds keys to subordinate isolation locks in a defined part of the plant/system.
- **Linking control** – a physical and procedural mechanism that ensures a parent board cannot be cleared or de-isolated while any child board is still active.

4.2. Roles – Tiered Isolations

All roles defined in the Energy Tag and Lockout Standard ([BST-00004](#)) and Complex Isolation Procedure ([PRO-02657](#)) apply. For Tiered Isolation, the additional role requirements are:

Authorised Isolator	One Authorised Isolator (AI) is accountable for the overall Tiered scheme (even if multiple AIs support specific sections).
Isolation Permit Issuer	There is normally one Isolation Permit Issuer (IPI) for the whole Tiered Isolation, even if there are multiple child boards / permits.
Isolation Permit Recipient	Each distinct workplace (or group of workplaces) will have its own Isolation Permit Recipient (IPR) and often its own child lock board.
Access Officer / Duty Operator	The Access Officer / duty operator must understand the full tiered structure and sequence of isolation / de-isolation.

4.3. Prerequisites for Tiered Isolations

Tiered Isolations must always be treated as Complex (with extra controls). Before starting, ensure:

1. Tiered Isolation is needed

- The Authorised Isolator has confirmed a single Complex isolation is not sufficient.
- The decision to use Tiering is recorded in the outage / project plan and Isolation Instruction(s).

2. Information is adequate

- Current P&IDs, system schematics, single line diagrams and isolation diagrams are available and understood.
- All upstream/downstream links, bypasses and cross-ties are known (or clearly flagged as uncertain).

3. Permits and approvals

- PASS requirements are identified – Tiered Isolations for outages, confined spaces or high-risk work must be linked to PASS with appropriate risk based tollgates.
- Any variances from Minimum Isolation Standards are approved using the WHS Management System Deviation Approval Form in Protecht before the Tiered Isolation starts.

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4. Resources and equipment

- Enough lock boards (parent + children), locks and tags to support the structure.
- Trained and competent Authorised Isolators, Isolation Permit Issuers, Isolation Permit Recipients and Isolation Officers are available for all boards.

The decision to use a Tiered Isolation must be made and documented **before** any isolations are applied, not as a mid-job adjustment to a single board complex isolation.

5. Tiered Isolation Process – Isolation Steps

5.1. Tiered Isolation Planning

Tiered Isolation planning is where most of the risk is controlled. It builds on *Control Step 1 – Prepare for the Shutdown* from the Complex Isolation Procedure, with extra requirements:

Build the isolation “story” first

The Authorised Isolator and Isolation Permit Issuer must:

1. Map the system

- Sketch a simple flow schematic of the area in scope: sources → mains → isolations → units → workfaces.
- Identify natural “nodes” where isolation tiers make sense (e.g. plant feeds, trunk main sections, major manifolds).

2. Define tiers and boundaries

- Decide where master isolations sit (what they protect and what they don’t).
- Define each Tier (level) and the boundaries of each child isolation (e.g. “Train 1 filters”, “Sludge handling”, “Pump station 2 discharge”).
- Avoid unnecessary tiering – if one board can safely manage the isolation, use Complex isolation instead.

3. Choose board structure

- Identify the Parent lock board(s) for upstream isolations.
- Allocate a Child lock board for each distinct workface / part of the system under the master isolations.
- Assign each board a unique ID and intended location.

Design Parent/Child Rules

The Authorised Isolator must define and document:

- Which isolations belong to the parent board vs each child board.
- Who can work under each board (workgroups, contractors, disciplines).
- The dependency rules, for example:
 - no child board may be active unless the parent board is active.
 - parent boards cannot be de-isolated until all their child boards are cleared.
 - certain child boards may depend on others being isolated first.

These rules must be reflected in both:

- the Isolation Instruction(s); and

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- the de-isolation sequence.

Decide how boards will be linked

This procedure stays hardware neutral, but the principle is:

A parent board must physically and procedurally depend on its child boards so that it cannot be cleared or de-isolated while any child board is still active.

Typical controls (your hardware spec will define the exact method):

- Linking positions on the parent board where each child board applies a “linking lock” or equivalent device.
- The child board(s) cannot be cleared without removing their linking lock from the parent board *after* their own work and de-isolation are complete.
- The parent board cannot be fully cleared while any child linking lock remains in place.

Planning must include:

- which positions on each parent board are reserved for child board linking
- how child boards are labelled to show which parent they depend on
- how this is explained in pre-start and toolbox talks.

Document the Tiered structure in the Isolation Permit

There are usually two ways to document Tiered Isolations:

1. One Parent (Master) Isolation Instruction with sections for each Child (Subordinate) Isolation area; or
2. A Parent (Master) Isolation Instruction (for upstream isolations) plus separate Child (Subordinate) Isolation Instructions for each area.

Whichever model you use, the documents must:

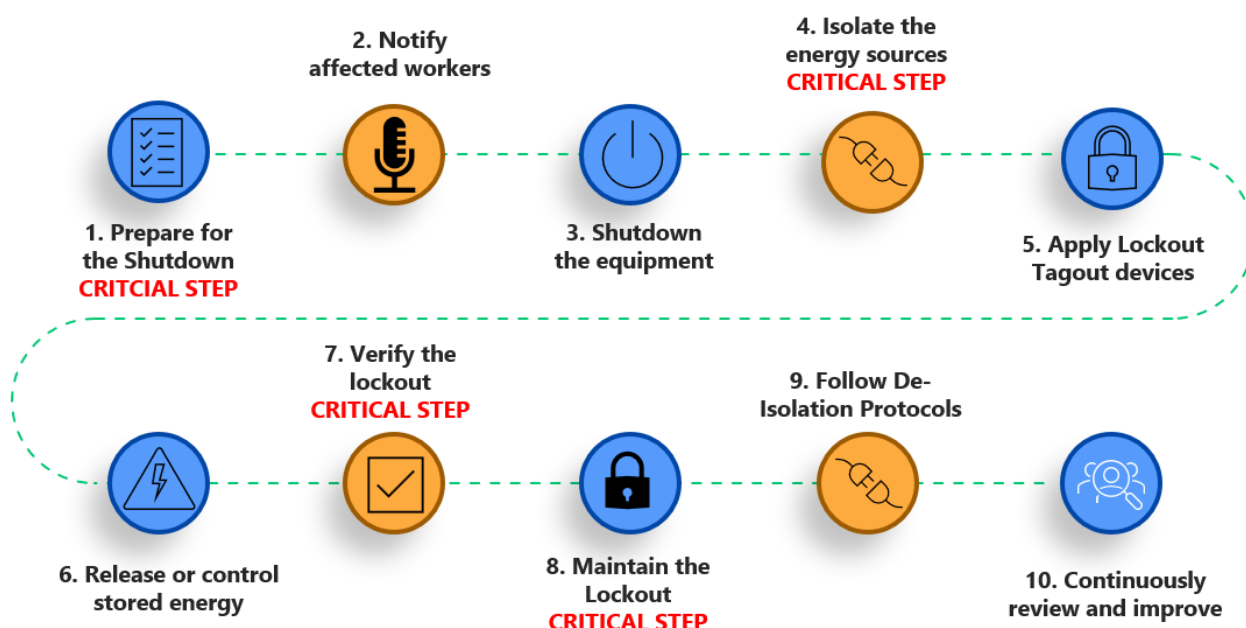
- have clear IDs and references (e.g. Master – LOTO-T01; Child – LOTO-T01-A/B/C)
- show the tiered structure (whose parent, who’s child)
- reference which lock board ID applies to which set of steps
- include the de-isolation sequence for all tiers.

5.2. Ten Isolations Steps for Tiered Isolations

Review the [Tiered Isolation Animation](#) to see how the Ten Isolation Steps are applied to Tiered Isolations.

All lock out tag out activities must follow the 10 Steps to apply the Isolation Critical Control. These control steps apply to Tiered Isolations. Where “follow the Complex Isolation Procedure” is noted, you apply that requirements in the Complex Isolation Procedure ([PRO-02657](#)) plus the Tiered Isolation extra controls described here. Critical Steps (strongest controls, highest assurance) are marked **CRITICAL STEP**. They cover planning, isolating, verifying and maintaining the Lockout.

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Control Step 1 – Prepare for the Shutdown

CRITICAL STEP

Do everything in Step 1 of the Complex Isolation Procedure, plus:

- build and document the Tiered Isolation map (parent/child relationships, lock boards / lock boxes and dependencies)
- clearly assign each isolation point to a Parent or Child Isolation Instruction and lock board / lock box
- record linking rules (e.g. which child lock boards / lock boxes must be shut first)
- obtain any required deviation approvals for Category 2 - Proved Isolation or Category 3 - Non-Proved Isolation isolations in the scheme, with a clear note on which tier they sit in.

Control Step 2 – Notify Affected Employees

Follow Step 2 in the Complex Isolation Procedure, plus:

- explicitly explain the tiered structure in briefings:
 - which lock board / lock box controls which part of the plant.
 - which lock board / lock box is the parent, and which are children.
 - where each lock board / lock box will physically be located.
- ensure contractors understand the tiered layout and how their own lock boards (if used) interface with Seqwater's lock boards / lock boxes.

Control Step 3 – Shut Down the Equipment

Follow Step 3 in the Complex Isolation Procedure, with special attention to:

- shutdown sequence that supports Tiering (e.g. upstream feed pumps and valves off before local equipment)
- any need to stage shutdown (e.g. keeping some systems running until alternate supply is in place).

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Control Step 4 – Isolate the Energy Sources

CRITICAL STEP

Follow Step 4 in the Complex Isolation Procedure, with extra rules:

1. Apply master isolations first
 - Implement all isolations on the parent board(s) before child boards are started.
 - Confirm that the master isolations truly protect all intended downstream areas (no unexpected bypasses or cross-ties).
2. Apply subordinate isolations next
 - For each child board, apply the isolations for that area as per its Isolation Instruction.
 - Where a child isolation depends on another child (e.g. sub-tier), follow the order in the plan.
3. Check alignment with the Tier plan
 - Before moving on, the Isolation Officer checks that every planned isolation step is assigned to the correct tier and board.
 - Any isolation found to be in the wrong tier is corrected and the documentation updated on the spot.

Control Step 5 – Apply Lockout and Tag Devices

This is where the parent/child lock board control really matters.

Follow Step 5 in the Complex Isolation Procedure, plus the following specifics:

1. Parent lock board(s)
 - Keys to all master isolation locks are placed on the parent lock board(s).
 - The Isolation Permit Issuer applies their black lock to each parent board.
 - One or more Isolation Permit Recipients (e.g. overall outage lead) apply green locks as agreed.
2. Child lock boards / lock boxes
 - Keys to child isolation locks (for a particular work area) are placed on the relevant child lock board / lock box.
 - Child lock boards / lock boxes are clearly labelled (e.g. “Tier 1 – Filters 1 & 2”, “Tier 2 – Sludge”).
 - An Isolation Permit Recipient for each work area applies their green lock to their child lock board / lock box.
3. Linking controls (parent/child relationship)

The tiered linking design must achieve all the following outcomes:

- A child lock board / lock box cannot be considered active unless the relevant parent lock board is also locked and active.
- A parent lock board cannot be fully cleared or de-isolated while any child lock boards / lock boxes that depends on it is still active.

Practically, this is done via linking locks or an equivalent mechanism, for example:

- Each child lock board / lock box has a dedicated “linking position” on the parent lock board, where it applies a lock when the child lock board / lock box is active.
- The child lock board’s / lock box’s linking lock can only be removed after all child isolations are removed and all workers have detached their red locks from the child lock board / lock box.

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- The parent lock board is not allowed to de-isolate while any of these linking locks remain in place.

The lock boards / lock boxes used in a Tiered Isolation must be uniquely identified.

4. Personal locks across tiers

- Workers attach their red personal locks to the lock board / lock box that directly controls the plant they are working on (usually a child lock board / lock box).
- Workers must understand which lock board / lock box they must lock onto and must not start work if their lock is only on the parent lock board unless that's been explicitly agreed as adequate for the task (which will be rare).

Control Step 6 – Release or Control Stored Energy

Follow Step 6 in the Complex procedure, noting that:

- stored energy in upstream systems (covered by parent lock boards) and downstream systems (covered by child lock boards / lock boxes) must both be controlled
- the Isolation Permit must make clear which tier is responsible for which stored energy controls.

Control Step 7 – Verify the Lockout

CRITICAL STEP

Verification now has *two dimensions*:

- per isolation point; and
- per tier / lock board / lock box.

Follow Step 7 in the Complex Isolation Procedure (verification of each isolation point) plus the following:

1. Apply dual verification as a default for Tiered Isolation Schemes:

- This means:
 - the Isolation Officer (who installed isolations) performs verification; and
 - a second verifier (Authorised Isolator, another Isolation Officer, or the Isolation Permit Issuer) independently verifies and signs off.

2. Verify the Tiered Isolation integrity:

- Confirm that for each child lock board / lock box, all its isolations are effective and correctly labelled.
- Confirm that master isolations on parent lock boards are effective for all child areas they are supposed to protect (e.g. by trying to start feed pumps, observing zero pressure/flow in downstream lines, etc.).
- Confirm that linking controls (locks/positions on parent and child lock boards / lock boxes) match the designed Tiered Isolation Structure.

3. Record verification clearly, showing:

- for each isolation point, who verified and how.
- Per lock board / lock box (parent and child), who performed second verification and when.

No work may start under *any* child lock board / lock box until both that child and its parent lock board / lock box have passed verification and have Permit Issuer, Permit Recipient and Personal Locks in place.

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Control Step 8 – Maintain the Lockout

CRITICAL STEP

Follow Step 8 in the Complex Isolation Procedure, plus:

1. Parent lock board status management
 - Parent lock board(s) remain active for the whole time any child lock board / lock box is in use.
 - Black Permit Issuer lock(s) must remain on the parent lock board until all child lock boards / lock boxes are cleared and deisolated.
2. Child board status management
 - Each child lock board / lock box is managed by its Isolation Permit Recipient in the same way as a Complex Isolation: red Personal Locks for workers, green Permit Recipient lock, sign on/off, shift handover.
 - If a child work area completes early, that child lock board / lock box can be de-isolated (see Step 9) while other Child Isolations remain active – but the parent lock board must stay active until all Child Isolations are complete.
3. Handover across multiple boards
 - Handover at shift change must cover the whole tiered scheme, not just individual boards:
 - status of each board (active, paused, complete)
 - which boards are still linked to which parents
 - any restrictions on de-isolation or testing.
4. Break in work
 - Breaks for individual child workfaces can be managed at the child board level (workers' red locks removed, board left in locked configuration as per complex procedure).
 - Extended breaks that affect the entire scheme (e.g. site demobilisation) must be treated as a planned pause with a defined strategy for:
 - leaving master isolations in place vs converting to OOS.
 - securing lock boards.
 - re-verification required on restart for each tier.

Control Step 9 – Follow De-Isolation Protocols

Tiered de-isolation is about sequence and who has permission to clear what.

Follow Step 9 in the Complex procedure, with these additional rules:

1. Child boards first, parent board last
 - De-isolate child boards (and their associated assets) before removing master isolations on the parent board.
 - For each child board:
 - ensure all workers have removed red locks.
 - Isolation Permit Recipient removes green lock.
 - Isolation Officer removes orange isolation locks on that child board's isolation points.

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- linking lock(s) from that child board to its parent board are removed only after all above are complete.

2. Parent board conditions for de-isolation - the parent board must not be de-isolated until:

- all child boards that depend on it are fully cleared and all linking locks have been removed.
- the Authorised Isolator / Isolation Permit Issuer confirm there is no remaining work under that parent isolation.
- PASS and other permits allow de-isolation (tollgates met, sign-offs complete).

3. Testing / Inch and Test in a Tiered context

- If testing is required on a child area, this is usually done at the child level (child isolation temporarily adjusted) while the parent isolation remains in place.
- If testing requires re-energising the upstream (parent) system, this must be carefully planned in the Isolation Instructions to avoid exposing other child areas.

4. Final restart and handback

- When all boards are cleared, the Isolation Officer and Isolation Permit Issuer de-isolate the parent board and restart plant in the planned order.
- Access Officer / duty operator is notified of completion, and plant is handed back to normal operational control.

Control Step 10 – Continuously Review and Improve

For Tiered Isolations, post job reviews are particularly valuable. After each significant Tiered Isolation (e.g. major outage, multi-board scheme), the Authorised Isolator and Isolation Permit Issuer should:

- review whether the tiered layout (parent/child structure, boards, linking) worked as intended
- adjust Isolation Instructions, tiered diagrams, board IDs or linking logic to simplify and de-risk future shutdowns
- provide insights to the LOTO SME / LOTO Working Group so Tiered Isolation learnings feed into:
 - plant modifications (easier isolation points)
 - training and simulations
 - updates to the Energy Tag and Lockout Standard ([BST-00004](#)) or Complex Isolation Procedure ([PRO-02657](#)).

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6. Definitions

Refer to the Energy Tag and Lockout Standard ([BST-00004](#)) for definitions relating to isolations. The following definitions are included to give context to the Simple Isolation process.

Term	Definitions
Child (Subordinate) Isolation	A downstream isolation that controls hazardous energy to a specific plant section or work area and which depends on an upstream Parent (Master) Isolation remaining effective.
Child Lock Board / Lock Box	A lock board / lock box that holds the keys to Child (Subordinate) Isolation locks for a defined work area, and which is linked to a Parent (Master) Lock Board under the Tiered Isolation design.
Linking Lock / Linking Control	The physical and procedural mechanism (for example, a dedicated lock position on the Parent Lock Board) that links each child lock board / lock box to its parent, preventing de-isolation of the parent while any child isolation is still active.
Parent (Master) Isolation	An upstream isolation that controls hazardous energy to more than one downstream system or work area, and which must remain in place while any dependent Child (subordinate) Isolations are active.
Parent Lock Board (Master Board)	The lock board that holds the keys to Parent (Master) Isolation locks and acts as the top level of control in a Tiered scheme; it cannot be fully cleared or de-isolated while any linked child lock board remains active.
Tiered Isolation	An isolation design where one or more upstream ("master") isolations protect multiple downstream ("child") isolations and work areas, controlled by a structured set of parent and child lock boards and a defined de-isolation sequence.

7. Roles and Responsibilities

This section supplements the roles defined in the Energy Tag and Lockout Standard ([BST-00004](#)). The following additional responsibilities apply for Tiered Isolations.

Role	Responsibility
Access Officer (or Duty Operator)	On top of the responsibilities specified in the Complex Isolation Procedure (PRO-02657), the Access Officer must for Tiered Isolations: • Maintain an overview of the entire Tiered Isolation Scheme, including which parent and child lock boards / lock boxes are active and which plant sections they protect. • Ensure operational changes (e.g. pump starts, valve moves, network reconfiguration) are not made that would undermine parent or child isolations without consultation with the Authorised Isolator/Isolation Permit Issuer. • Maintain site or system status tools (control room boards, logs, PASS) so they reflect the Tiered Isolation status (active lock boards / lock boxes, dependencies, de-isolation sequence). • Be part of planning discussions for staged de-isolation to ensure restart does not introduce unexpected flows or pressures into any remaining child area.

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Role	Responsibility
Authorised Isolator	In addition to the responsibilities specified in the Complex Isolation Procedure (PRO-02657), for Tiered Isolations the Authorised Isolator must: - Decide that a Tiered Isolation Scheme (parent/child) is required rather than a single complex isolation, and document that decision. - Design and approve the overall Tiered Isolation structure, including parent and child isolation boundaries, lock board IDs and linking arrangements. - Ensure all energy sources across all tiers (including bypasses, cross-ties and alternate feeds) are identified in the Tiered Isolation Permits. - Document the parent/child relationships and de-isolation sequence in the Isolation Permits. - Review and approve any proposed change to the Tiered layout (e.g. adding/removing lock boards / lock boxes, changing dependencies) before it is implemented.
Isolation Officer	Beyond the responsibilities specified in the Complex Isolation Procedure (PRO-02657), for Tiered Isolations the Isolation Officer must: - Implement isolations in line with the Tiered design – ensuring each isolation point is associated with the correct parent or child lock board / lock box. - Clearly identify isolation points in the field so that it is obvious which lock board / lock box and tier they belong to (e.g. tagging with isolation / board ID). - Verify that Parent (Master) Isolations and all Child (Subordinate) Isolations together give effective control of hazardous energy to each workplace. - Ensure linking locks or equivalent arrangements between lock boards and lock boxes are applied and maintained as per the plan, and report immediately if they are missing or incorrect. - Coordinate any required re-verification across tiers after operational changes, Inch-and-Test steps, or extended breaks in work.
Isolation Permit Issuer	On top of the responsibilities specified in the Complex Isolation Procedure (PRO-02657), the Isolation Permit Issuer must for Tiered Isolations: - Control, or clearly delegate control of, the parent lock board(s) and ensure there is clarity about who is the Issuer for each lock board / lock box in the Tiered scheme. - Ensure no parent lock board is de-isolated or cleared while any dependent child lock board / lock box remains active or linked. - Verify that all linking locks / linking arrangements between parent and child lock boards / lock boxes are in place and match the Tiered Isolation plan before work starts and at each shift handover. - Make sure handover conversations and records cover the status of all boards in the Tiered Isolation Scheme, not only the lock board / lock box closest to the work area. - Coordinate the sequence of de-isolation across all lock boards / lock boxes to match the approved Tiered de-isolation plan.

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Role	Responsibility
Isolation Permit Recipient	In addition to the responsibilities specified in the Complex Isolation Procedure (PRO-02657), each Isolation Permit Recipient must for Tiered Isolations: • Understand and be able to explain which part of the plant / system their lock board / lock box controls, and which parent lock board(s) it depends on. • Ensure their workgroup's red personal locks are applied to the correct child lock board / lock box, not the parent lock board, unless explicitly planned otherwise. • Coordinate with other Isolation Permit Recipients so that actions in one child area (e.g. testing, partial de-isolation) do not compromise isolation for another area under the same parent. • Confirm, before requesting de-isolation, that all workers on their child lock board / lock box are clear, all red locks removed, and all isolation points for that child are ready per the Tiered de-isolation sequence. • Clearly communicate to the Isolation Permit Issuer and other Isolation Permit Recipients when their child lock board / lock box moves between active, break-in-work and complete. • Can not hold the dual role of Isolation Permit Issuer for the same Isolation Permit and scope of work.
Line Supervisor	On top of the responsibilities specified in the Complex Isolation Procedure (PRO-02657), the Line Supervisor must for Tiered Isolations: • Identify early when the planned work will sit under a Tiered Isolation and ensure this is reflected in planning and pre-start discussions. • Ensure each work group clearly understands which lock board / lock box (parent or child) they must lock onto. • Reinforce the parent/child structure and any de-isolation dependencies at toolbox/pre-start briefings. • Monitor the job for scope creep that might require extra child lock boards / lock boxes or changes to the Tiered Isolation Scheme and escalate to the Authorised Isolator / Isolation Permit Issuer when this occurs.
LOTO Subject Matter Expert (SME)	Beyond the responsibilities specified in the Complex Isolation Procedure (PRO-02657), the LOTO SME has the additional responsibilities for Tiered Isolations: • Advise planning teams on when a Tiered Isolation is appropriate and how to structure parent/child relationships for complex plant. • Help design and maintain standard Tiered Isolation Schemes for repeating outages (e.g. full-plant shutdowns at key WTPs). • Review selected High-Risk Tiered Isolations (e.g. major outages, multi-board systems) as part of assurance or pre-start checks. • Use learnings from Tiered Isolation post-job reviews to recommend updates to the Energy Tag and Lockout Standard (BST-00004), Complex and Tiered Isolation Procedures, and training.

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Role	Responsibility
Workers/Contractors	In addition to the responsibilities specified in the Complex Isolation Procedure (PRO-02657), workers and contractors must for Tiered Isolations: • Know which lock board / lock box (parent or child) controls the plant they are working on and lock onto that lock board / lock box as instructed at pre-start. • Never move or remove linking locks or change anything on a parent or child lock board / lock box other than their own red personal lock. • Confirm that the correct parent/child locks (black/green/linking) are in place and the board is in the expected state before starting work. • Immediately stop work and notify the Isolation Permit Recipient / supervisor if they see any inconsistency between the Tiered plan (as explained at pre-start) and what is happening in the field or on the lock boards / lock boxes.

8. Training and Competency

Refer to the Energy Tag and Lockout Standard ([BST-00004](#)) for details of training and competency requirements for Complex Isolations.

9. References and Related Materials

Description	Location
BST-00004 Energy Tag and Lockout Standard	REX
GDE-00368 Principal Contractor Minimum Health, Safety and Environmental Requirements Guideline	REX
MAN-00313 Critical Controls Handbook	REX
PRO-00006 Electrical – High and Low Voltage Procedure	REX
PRO-00808 Contractor Management Procedure (HSW, Env & DWQ)	REX
PRO-02657 Complex Isolation Procedure	REX
TEM-00077 Isolation Permit	REX
Tiered Isolation Animation	Vimeo

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