

NEW EQUIPMENT & SYSTEM APPROVAL PROFORMA

Ref: 11/9643

Note: the prompts given below are only a guide to the information required for approval. Dependent on the type of equipment or system that requires approval delete any section that is not applicable or include additional information if necessary. **Mandatory** fields are marked with an asterisk (*).

1 Equipment or System to be approved *

Revised Approval is sought due to the inclusion of curved expansion switches, following the results of trials, for a standard 'Track Expansion System' for use over longwall mining beneath railways in the NSW Southern Coalfields to minimise track maintenance and maintain rail operations at normal track speed during mining.

The components of the 'system' that require Type Approval are as follows:

- PRE 300mm travel Expansion Switch with 1:20 canted rails and raised UIC33 Checkrails in accordance with British Standards (see EWAF 700/TR/260608/186);
- Pandrol Zero Toe Load (ZTL) clips Fastclip FC1509 ZLR Assembly for Concrete Sleepers in accordance with Drg. No. SK5725; and
- Anchor point Sleeper Restraints or "Paddles" (see EWAF 700/TR/160209).
- **Type 4 D Expansion Switch (added August 2011)**

Other ZTL clips being used are standard Pandrol 'e' clips and have not been included in this application.

Individual risk assessments have already been undertaken in accordance with ARTC requirements for each component of the system as part of the Walver Approval process.

This request is for a revisions of the previous Type Approval (Ref 10/2942) to now include curved track (curved expansion switches) following recent trials. The previous Type Approval, though not specific, only considered switches in tangent track.

Supersedes type approval 10/2942.

2 Originator *

Name: Graeme Robinson (0410 455 911)

Company: GHD Pty Ltd

Richard Morrissey (0408 216 525)

3 Introduction *

The 'Track Expansion System' that we are seeking approval for has been operating in track since August 2008, under a series of approved waivers (as mentioned above) for various track components. The expansion switches at Tahmoor (10 off - 5 pairs) have been installed at 150-200 metres spacing between 93.685km and 94.325km on the Main Southern Railway at Tahmoor, with anchor points at mid span between switches secured using sleeper "paddles" to prevent rail creep.

Monitoring systems have been implemented during the mining period to ensure that the track is always within ARTC base operating standards. This system enables minor adjustments to be carried out well in advance of any track condition issues impacting on rail standards and/or operations.

By early August 2009, the longwall face had moved more than 300m beyond the rail corridor and the monitoring systems being used to measure the progress of the mining subsidence along the track since 9/12/08, indicate that the rail infrastructure has subsided over 550mm (the maximum predicted subsidence for LW25 is 600mm).

A report has been issued to ARTC requesting the reduction of monitoring frequencies and the removal of the now redundant expansion switches from the Southern end of the site. The system that has been used successfully for the mine subsidence management of the rail corridor over LW25, will now be systematically removed as subsidence decreases over the few months (and stockpiled for re-used over future longwalls).

It is proposed to adopt this very successful system to manage mine subsidence under the rail corridor for future longwall mining for both Tahmoor Coal (Xstrata) and Illawarra Coal (BHPB) in the very near future.

Illawarra Coal's LW703 will be the next mining to have an impact on the rail corridor at Douglas Park NSW in mid 2010.

Due to possession availability, it is proposed to install a similar system in this location as was deployed at Tahmoor for LW25 (i.e. 5 sets of expansion switches at 200m centres) between 70.850km to 71.850km in October 2009.

Pending ARTC approval, it is proposed to utilise this management system for the next 10-15 years in this vicinity to assist the coal industry in successfully mining coal beneath the rail corridor, whilst at the same time, not impacting on ARTC's business.

To this end, we are seeking to obtain Type Approval for the entire management system so that we do not have to continually apply for waiver approvals in the future.

A *Surface Safety and Serviceability Management Plan* (SSSMP) will be prepared for each proposed longwall for approval by ARTC, the NSW Independent Transport Safety and Reliability Regulator (ITSRR) and the NSW Department of Primary Industry (DPI) prior to proceeding with any mining under the track. The SSSMP includes a comprehensive risk assessment/management process in accordance with ARTC risk requirements.

4 Determination of Need *

In the absence of a suitable, engineered rail management system to manage the impact of longwall mining beneath railways, no approval would be granted by the various stakeholders for this to proceed.

A track management system has been developed by the Tahmoor Rail Management Group (RMG) that utilises an engineered solution and a multiple redundancy monitoring system to enable early warning systems to address any potential problems that may impact on track safety and reliability well before they become an issue.

This enables both the rail and mining businesses to proceed without impeding or impacting on one another during longwall mining near or beneath the rail corridor.

5 Significant Change or Not (as determined by the Manager Standards) *

This change in equipment or system is assessed as MINOR

6 Review Panel (as determined by the Manager Standards) *

John Furness - Manager Standards
Richard Crooks - Infrastructure Manager or Stephen Fleck - Delivery Manager
Graeme Robinson - GHD (or nominated representative)
Tim Neville - Senior Geotechnical Engineer

7 Safety

The design layout for each longwall varies and is based on a number of design elements including (but not limited to):

- Rail operations – track speed and traffic types;
- Track geometry and configuration;
- Signalling and communications systems;
- Major structural elements such as bridges, culverts, embankments, cuttings, etc;
- Geology (including geological anomalies, faults, etc.) of the area being mined;
- Predicted subsidence based on mining data collected over a long period;
- Angle of orientation, speed and depth of the longwall

An engineering design is developed and a comprehensive risk assessment process, in accordance with ARTC risk requirements and attended by all key stakeholders, is conducted for each proposed longwall.

The results of the risk assessment and mitigation measures adopted are included in the **Safety Management Plan** for the project(s).

The following key controls will be adopted during each longwall mining period:

1. Installation of continuous remote monitoring for:

- Switch displacement
- Rail core temperatures
- Rail stress

2. On-site PW52 track inspector daily

3. Ground surveys (2D and 3D)

4. Switch bearer and rail creep surveys

5. Use of a track recording machine daily to measure track geometry

6. Assessment of daily ambient temperature forecast

7. Continuous remote monitoring alarms, relayed back to control room

8. Provision of a data logger linked to a computer for daily data analysis

9. Daily and weekly reporting of results and analysis

Trigger levels based on ARTC BOS have been incorporated in the monitoring/alarm system and data streaming from the measuring devices will be displayed in the Tahmoor Coal and/or Illawarra Coal Control Centres via a web based monitoring system that will be accessible by ARTC and the management team 24/7.

Spare parts, ballast, track components will be located on site and contract rail crew on standby for any mitigating actions if performance is not as anticipated,

Location(s) will have excellent access and will be in a sound stable track location(s).

A *Track Examination Checklist* has been developed for the project and is being used for scheduled, detailed inspections of the 'Track Expansion System' whilst it is in track. The inspection frequencies vary to suit the timing and impact of the mine subsidence and the inspection regime is detailed in the SSSMP.

8 Performance and Suitability

The Expansion Switch System has been successfully used in track, prior to, and during the impact of longwall mining since August 2008 and in that time, the track has subsided up to 600mm over 900 metres.

The performance and suitability of the system to cope with this type of impact can be best explained as follows:

Track Issues:

The primary issues associated with longwall mining beneath the rail line at Tahmoor are summarised below:

- Systematic and non-systematic subsidence induced track geometry variations occurring that are sufficient to cause rough riding or derailment of rail vehicles.
- Excessive rail stress changes (either tensile or compressive) that could lead to either broken rails or misalignment of track resulting in train derailment.
- Use of "non standard" track (expansion switches, anchor points and zero toe load clips) as a means of

compensating for subsidence induced changes of rail stresses.

Track Performance:

Track Geometry:

Four track geometry parameters (gauge, cant, short and long twist) are measured by track staff on a daily basis using the Amber trolley. Additionally, visual inspections are undertaken daily and regular AK car inspections are performed by ARTC. Base line Amber trolley measurements were taken on 23/1/09 when differential subsidence was minimal. The base line measurements are used for comparison to show the effects of the mining subsidence during the active period.

Cant for the down main remains very close to the levels recorded on the base line recording and is close to design levels. Cant throughout the subsidence affected area has remained well clear of blue trigger areas which equate to Category 4 of ARTC Base Operating Conditions. These cant levels are suitable for full track speed.

Similar analysis has been undertaken for short and long twist using the daily measurements taken by the Amber/Abtus trolley, and for top from results provided from the last AK car runs. In all cases, these parameters have remained well within category 5 of ARTC Base Operation Conditions and are suitable for full speed operation.

Rail Stress:

Rail stresses are monitored for each rail at 25m intervals along the track from (and including) the two anchor point interfaces with the standard CWR track at each end of the site. Rail stresses are automatically recorded every 5 minutes and can be viewed, downloaded and reviewed remotely from a computer.

During the monitoring period, the track has been subject to a maximum rail temperature of 62.9°C and a minimum of -2.9°C. Additionally, the area has undergone ground extension and shortening as well as vertical subsidence of up to 534mm. It has been clearly demonstrated that the use of anchor points and expansion switches can adequately control rail stresses to safe levels to allow operation of trains at current reduced track speeds. As the monitoring system provides an effective means of monitoring the rail stresses and allowing remedial actions to be taken if required, there is no reason that trains should not be allowed to recommence operation at full track speed.

Non Standard Track:

The installation of expansion switches and zero toe load clips at Tahmoor does not comply with current ARTC track standards. The operation of trains over this section of track is currently authorised by a series of ARTC Engineering Waivers for expansion switches, ZTL clips and sleeper "paddles" to manage creep.

The above information demonstrates that all rail stresses can be adequately controlled in the non standard track area and adjacent CWR by the "Track Expansion System" and that ongoing monitoring can readily identify any deviations away from the allowable stress levels so that remedial actions can be implemented if necessary.

9 Reliability

Very few issues have been encountered with the system since it has been installed in track.

Adjustments have simply been made by unclipping and pulling the rail between expansion joints to rectify creep, cutting and adjusting track and local 'spot' tamping.

A 40km/h temporary speed restriction was imposed at the request of ITSRR/DPI at the commencement of the project as a precautionary measure ONLY, but the track condition throughout the project timeframe has not required a TSR to be imposed due to the track condition as detailed in Section 8..

No disruptions to service were imposed during the project period for LW25.

10 Maintainability

A Maintenance Plan was developed at the project commencement and included in the SSSMP.

A standard ARTC maintenance inspection regime has been adopted by the Tahmoor RMG for the periods prior to and directly following the subsidence period.

Current inspections during the subsidence period are being carried out during 24/7 surveillance regime. This has proven to be unnecessary and it is proposed to reduce this to daily for future longwalls.

Minor maintenance to date has been carried out As Traffic Permits (ATP) without any impact on normal operations.

Any major works, such as production tamping to improve alignment, removal/installation of expansion switches will be carried out during planned track possessions.

For Type 4 D Expansion Switch, refer to PRE Maintenance Manual (provided as supporting documentation).

11 Approval *

This request for approval is for the entire "Track Expansion System" that applies to the following equipment for use at Tahmoor and Douglas Park, NSW on the Main Southern Railway:

- PRE 300mm travel Expansion Switch with 1:20 canted rails and raised UIC33 Checkrails in accordance with British Standards (see EWF 700/TR/260608/186);
- Pandrol Zero Toe Load (ZTL) clips Fastclip FC1509 ZLR Assembly for Concrete Sleepers in accordance with Drg. No. SK5725; and
- Anchor point Sleeper Restraints or "Paddles" (see EWF 700/TR/160209).
- **Type 4 D Expansion Switch (added August 2011)**

Other ZTL clips being used are standard Pandrol 'e' clips and have not been included in this application.

This system has been adopted to minimise the maintenance and operational impact imposed by longwall mining under the Main Southern rail corridor in NSW.

Once the subsidence associated with the mining ceases, the switches, clips and anchor points will be removed and the

track restored to its previous state. It is proposed to re-use the components of the system on other longwalls currently programmed by both Xstrata Coal and BHP Billiton for the next 12-15 years in this area.

New iterations of the expansion switches (Type 4) are currently being trialled at Tahmoor under Waiver that will:

- Improve system performance
- Reduce maintenance and risk
- Reduce ongoing costs.

The results of this trial will be reviewed, analysed and documented prior to the next planned track possession on 22 January 2011, and approval sought in future to include this switch in the 'system'.

Type 4 D Expansion Switch added to "Track Expansion System" Type Approval August 2011 following trials under Waiver 600/TR/011010/287.

The benefits of this expansion switch over the others previously trialled, approved and installed, include the following:

- ☐ Enables expansion of 600mm (previous switches limited to 300mm).
- ☐ Simpler design and less components mean lower risk of failures and less maintenance intervention
- ☐ Minimises number of switches required to be installed in future - lower risk and maintenance costs
- ☐ Enables full speed operation in both directions.

12 Conditions of Approval *

Conditions for approval include:

- Equipment has been installed in accordance with manufacturer's specifications/instructions;
- Safety, monitoring and system management details will be included in the SSSMP and submitted to ARTC for approval;
- Training will be carried out for ARTC and the Tahmoor Colliery track maintenance staff, ARTC Network Control staff at Junee and Colliery Control Room staff;
- Waivers have been approved by ARTC for all track components and the monitoring system that form part of the 'Track Expansion System' that we are now submitting for Type Approval.
- Each future longwall will be subject to an individual risk assessment process in accordance with ARTC requirements and the findings of the risk process will be included in the SSSMP. The SSSMP document for each longwall is issued to all stakeholders for review and endorsement prior to implementation by the coal miners.

13	Does the Originator accept the additional Conditions of Approval as set by the Review Panel:	Yes	<input checked="" type="checkbox"/>	No	<input type="checkbox"/>	N/A	<input type="checkbox"/>
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14 Sign off

Review Panel:

John Furness

Stephen Fleck

Graeme Robinson

Tim Neville

[Signature]
see email
see email
see email

Date: 31/1/2011

Date: 17/1/2011

Date: 25/12/2010

Date: 31/1/2011

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15 Conditions of Approval * for additional equipment (Type 4 D Expansion Switch)

Same conditions as outlined in Item 12 above.

16	Does the Originator accept the additional Conditions of Approval as set by the Review Panel:	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>	N/A	<input type="checkbox"/>
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17 Sign off for additional equipment (Type 4 D Expansion Switch)

Review Panel:

John Furness

Tim Calver

Ross Barber

Peter Micenko

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[Signature]
[Signature]

Date: 16/8/2011

Date: 16/8/11

Date: 29/8/11

Date: 18/09/2011

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