



COMPLIANCE AUDIT PROGRAM

# Compliance Audit Program 2016 Report

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### More information

Resources Regulator, Department of Planning and Environment

516 High St, Maitland NSW 2320

Phone: (02) 4931 6666 | Fax: (02) 4931 6790

[resources.regulator@industry.nsw.gov.au](mailto:resources.regulator@industry.nsw.gov.au)

[resourcesandenergy.nsw.gov.au/regulation](http://resourcesandenergy.nsw.gov.au/regulation)

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# 1. Introduction

## 1.1 Background

The Resources Regulator's compliance audit program aims to:

- assess the level of compliance with regulations
- gain insights to improve title conditions, policies or the general regulatory framework
- assess auditee performance and provide feedback to them on how they may be able to improve their performance
- increase stakeholder confidence in the regulatory system
- increase the level that titleholders are actively managing their own compliance.

The compliance audit program is developed using a risk review process to identify the audit focus each year. A risk assessment methodology (broadly based on *AS/NZS ISO 31000:2009 Risk management – Principles and guidelines*) is used to develop a broad risk profile for each title to facilitate the development of the annual audit program.

Risk factors used include:

- whether the regulator has primary regulatory responsibility
- the type, size and complexity of operations and activities
- the location of activities (environmental sensitivity of surrounding area and proximity of residents)
- results of previous audits and titleholder compliance history
- stakeholder concerns.

This report provides the findings of the 2016 annual compliance audit program.

## 1.2 Focus of the 2016 audit program

### 1.2.1 Mining leases

Conditions of development consents issued under the *Environmental Planning & Assessment Act 1979* for major mining projects include a requirement for regular independent auditing of such projects. These independent audits are required to include the environmental conditions of any mining leases issued under the *Mining Act 1992* for each project.

The regulator undertook a review of the most recent independent environmental audit report for each major mining project in 2015. Based on this review, it was established that there was only one major coal mining project which did not have an independent audit condition included in its development consent, and hence this mining operation was included in the 2016 audit program.

Generally, where a mining operation has had an independent environmental audit completed within the last three years, these operations were excluded from the 2016 audit program.

There were 33 mining operations in NSW that were considered to be major metallic or industrial mineral mines (as identified in the 2014 NSW Minerals Industry Profile (NSW Trade & Investment 2014)). Of these 33 mining operations, only 11 are known to be subject to development consents that include an independent audit requirement. Four metallic mineral mines were included in the 2014/2015 audit program, and based on the high rates of non-compliance identified during these four audits, a further four metallic mineral mines, and five industrial mineral mines were included in the 2016 audit program.

## 1.2.2 Exploration

A desktop audit of approximately 1100 coal and mineral exploration licences was undertaken in 2015. The results of this desktop audit were used to identify exploration licences to be subject to more detailed compliance audits as part of the 2016 audit program.

Fourteen mineral exploration licence holders that were noted to have undertaken drilling operations within the last two years were selected for inclusion in the 2016 audit program. These 14 exploration titleholders included five titleholders who were successful in gaining grant funding for drilling operations under the government's New Frontiers Cooperative Drilling Program Round 1.

The 2015 desktop audit highlighted that there had been very little active exploration in the coal exploration sector in the last two years. However, to gain an understanding of the key compliance issues in this sector, four coal exploration projects were proposed to be included in the 2016 compliance audit program.

## 1.2.3 Reject and tailings emplacements

In July 2015, fine tailings escaped from a reject emplacement area at Clarence Colliery causing major erosion which cut a large gully into the side of the emplacement. The incident caused both coarse reject and fine tailings to flow down a valley and into the Wollangambe River in the Blue Mountains Heritage Park. A risk assessment undertaken as part of the investigation conducted by the regulator identified that the incident was a high risk environmental incident.

Following the Clarence incident, a desktop review of tailings facilities at other similar underground mines was undertaken to identify any sites where similar risks may occur. The review included identifying mines with tailings or reject emplacements, whether or not those emplacements have approvals in place under section 101 of the *Coal Mine Health and Safety Act 2002* (now repealed), and whether or not the emplacements have been prescribed under the provisions of Schedule 1 of the *Dam Safety Act 1978*.

The desktop review of tailings facilities identified four mines with reject or tailings emplacements that may pose similar risks to the Clarence incident. Three of these facilities were proposed to be included in a targeted audit program specifically looking at compliance with emplacement requirements.

## 1.3 Completion of the 2016 audit program

A total of 36 audits were proposed to be completed as part of the 2016 compliance audit program. One audit was deferred early in the program due to an ongoing investigation, leaving 35 audits to be completed during the year. Twenty eight of these audits were completed as scheduled; however changes to the audit program which arose during the year resulted in a total of 42 audits being completed by the audit team.

A significant change to the audit program occurred in the second half of 2016 with the Environment Protection Authority (EPA) proposing a joint compliance program relating to dams on NSW mine sites. A

total of 14 mining operations were identified for audit as part of the joint compliance program, with these audits being completed by December 2016. The regulator's focus for the joint audit program on mine dams related to dam safety management systems, and as such, this joint program replaced the targeted audit program on rejects and tailings emplacements that was originally proposed.

As a result of the joint audit program, and a reduction in auditor resources, only 28 of the scheduled 35 compliance audits were able to be undertaken; however, the intensive nature of the joint compliance program resulted in more audits being undertaken over the year than originally planned.

## 2. Compliance audit findings

A total of 28 comprehensive audits were completed during the 2016 compliance audit program. These audits included 18 exploration licence holders and 10 mining operations. Table 2:1 lists the audits undertaken.

Table 2:1 List of sites audited

Titleholder	Site
Broula King Joint Venture Pty Ltd	Broula King Gold Mine
Sibelco Australia Limited	Cressfield Bentonite Mine
Department of Resources and Energy	Rylstone Drilling Program
Ridgeland Coal Resources Pty Ltd	Ridgeland Exploration Program
Whitehaven Coal Limited	Oaklands Exploration Program
Whitehaven Coal Limited	Vickery Exploration Program
Centennial Springvale Pty Ltd	Springvale Coal Mine
Centennial Springvale Pty Ltd	Western Coal Services
Argent (Kempfield) Pty Ltd	Trunkey Exploration Program
Big Island Mining Pty Ltd	Booths Reward Exploration Program
Cristal Mining Australia Limited	Cristal Mining Exploration Program
GFM Exploration Pty Ltd	Paupong Drilling Program
GFM Exploration Pty Ltd	Paupong Exploration Program
Gold Fields Australasia Pty Ltd	Cowal East Exploration Program
Triausmin Pty Ltd	Lewis Ponds Exploration Program
Idylway Venture Pty Ltd	Gundagai Exploration Program
Lachlan Metals Pty Ltd	Goulburn Exploration Program
Ochre Resources Ltd	Big Ben Exploration Program
Rimfire Pacific Mining Ltd	Fifield Exploration Program
Scandium21 Pty Ltd	Syerston Exploration Program
Sugec Resources Limited	Halls Peak Exploration Program
White Rock (MTC) Pty Ltd	Tenterfield Exploration Program
Balranald Gypsum Pty Ltd	White Plains Gypsum Mine
Cobar Operations Pty Ltd	Endeavor Mine
Peak Gold Mines Pty Ltd	Peak Gold Mine
Sibelco Australia Limited	Tallawang Mine
Stoneco Pty Ltd	Timor Limestone Quarry
Zeolite Australia Pty Ltd	Escott Zeolite Mine

Across the 28 audits completed, there was an average non-compliance rate of approximately 5.7%; however the non-compliance rate for individual audits varied from 0% to 16.6%. There were 12 audits where the non-compliance rate was above the average.



## 2.1 Exploration audit findings

### 2.1.1 General summary

Of the 18 audits undertaken of exploration licences, 14 were in the minerals sector with 4 in the coal sector. In some cases, exploration projects included more than one exploration licence, resulting in 26 exploration licences being subject to audit across the 18 audits completed.

Table 2:2 shows a breakdown of the current number of coal and mineral exploration titles against the number of audits undertaken in each sector. As can be seen, the relative percentage of audits undertaken is consistent with the relative percentages of the number of titles in each sector.

Table 2:2 Comparison between the number of titles in each sector and the number of audits undertaken

	No. Titles	% of Titles	No. Audits	% of Total Audits
<b>Coal Exploration</b>	177	21	4	22
<b>Mineral Exploration</b>	660	79	14	78
<b>Total</b>	837		18	

An overall summary of the performance of each sector is shown in Table 2:3.

Table 2:3 Overall summary of exploration compliance performance

Industry Sector	ND	NA	C	NC1	NC2	NC3	O	Total
<b>Coal Exploration</b>	73	294	315	0	0	10	21	713
<b>Mineral Exploration</b>	449	911	1189	0	49	68	102	2768

Where:

ND = Not determined

NC1 = Non-compliant 1

NA = Not applicable

NC2 = Non-compliant 2

C = Compliant

NC3 = Non-compliant 3

O = Observation of concern

Generally, lower rates of non-compliance were observed in the coal sector when compared to the minerals sector. No major non-compliances (NC1) were identified in any of the exploration audits completed in 2016. The average rate of non-compliance for coal exploration was observed to be approximately 1.4%, whilst for mineral exploration the average rate of non-compliance was observed to be approximately 4.2%.

### 2.1.2 Key issues

#### Coal exploration

A total of nine non-compliances were identified from the four coal exploration audits undertaken. All of these non-compliances were ranked NC3 being generally administrative non-compliances, with no NC1 or NC2 non-compliances identified.

Issues identified during coal exploration audits are summarised in Table 2:4.

Table 2:4 Issues identified in coal exploration audits

Issue category	Number of occurrences
<b>NC3</b>	<b>10</b>
Failure to comply with conditions of exploration approvals or Review of Environmental Factors commitments	2
Failure to obtain approval for exploration activities	2
Failure to obtain approval for groundwater monitoring and modelling plan	3
Miscellaneous	1
Poor consultation or complaint management practices	2
<b>O</b>	<b>21</b>
Failure to comply with conditions of exploration approvals or REF commitments	3
Failure to lodge or late lodgement of annual exploration reports	1
Failure to lodge or late lodgement of community consultation reports	1
Failure to obtain co-operation agreements with overlapping titleholders	2
Failure to pay or late payment of rents and levies	2
Miscellaneous	5
Poor borehole sealing or capping practices	2
Poor consultation or complaint management practices	3
Poor environmental management of exploration activities	2

Generally, most of the non-compliances and observations of concern relate to the failure to lodge or late lodgement of various reports and payments. This is an issue which has also been identified through internal departmental reporting processes and a compliance campaign has been implemented aimed at improving the level of compliance by titleholders in reporting and payments.

Active exploration activities were only occurring on one of the four audits undertaken. Given the lack of active exploration drilling, many of the conditions of title were not applicable at the time of the audit or were unable to be determined. However, where previous exploration drilling had been undertaken, a sample of drill sites was inspected to assess rehabilitation performance.

Drill sites inspected during the audits were observed to have been rehabilitated to a good standard. Drilling records were noted to be generally well maintained at each audit; however inspection and recording of borehole sealing practices did not always occur in accordance with the company's documented procedures.

## Mineral exploration

The range of issues identified in mineral exploration audits is summarised in Table 2:5. It was noted that there was a larger range of issues identified in mineral exploration when compared to coal exploration, with both NC2 and NC3 ranked non-compliances.

As with coal exploration, there were a number of non-compliances related to the failure to lodge or late lodgement of various reports and payments. It was also noted that there were several occurrences where titleholders had failed to notify Department of Primary Industries (DPI) – Water of drilling activities and in one instance, it was noted that the titleholder did not have a written access agreement with the landholder, although it was indicated that a verbal agreement was in place.

Table 2:5 Issues identified in mineral exploration audits

Issue category	Number of occurrences
<b>NC2</b>	<b>49</b>
Failure to comply with conditions of exploration approvals or REF commitments	12
Failure to meet minimum expenditure requirements	1
Miscellaneous	1
Poor borehole sealing or capping practices	15
Poor environmental management of exploration activities	14
Poor rehabilitation practices	5
Poor storage, labelling or management of chip and core samples	1
<b>NC3</b>	<b>63</b>
Failure to complete nominated work program	2
Failure to comply with conditions of exploration approvals or REF commitments	8
Failure to lodge environmental incident reports	1
Failure to lodge or late lodgement of annual exploration reports	5
Failure to maintain adequate records	4
Failure to meet minimum expenditure requirements	2
Failure to notify DPI Water of drilling activities	6
Failure to obtain written landholder access agreements	1
Failure to pay or late payment of rents and levies	4
Failure to provide environmental management report at renewal	3
Poor consultation or complaint management practices	10
Poor rehabilitation practices	1
Poor storage, labelling or management of chip and core samples	2
Technical management of exploration activities	14
<b>O</b>	<b>88</b>
Failure to complete nominated work program	6
Failure to comply with conditions of exploration approvals or REF commitments	14
Failure to lodge or late lodgement of annual exploration reports	3
Failure to maintain adequate records	4
Failure to meet minimum expenditure requirements	3
Failure to notify DPI Water of drilling activities	1
Failure to pay or late payment of rents and levies	6
Failure to provide environmental management report at renewal	2
Miscellaneous	7
Poor borehole sealing or capping practices	2
Poor consultation or complaint management practices	16
Poor environmental management of exploration activities	11
Poor rehabilitation practices	5
Poor storage, labelling or management of chip and core samples	3
Technical management of exploration activities	5

There were 34 instances of non-compliances or observations of concern related to the failure to comply with the conditions of exploration activity approvals or REF commitments. In many cases, the REF's had been prepared by consultants to obtain approvals but the commitments made were often not followed through by the titleholder. A common issue identified in relation to drilling activities was the use and management of subcontract drillers. In most cases where there was an identified failure to comply with REF commitments, it was noted that the subcontract driller had not been provided with a copy of the REF nor been made aware of the environmental controls or other requirements it was responsible for.

The largest number of non-compliances and observations of concern (53) generally relate to the environmental management of exploration activities. Broadly speaking, these issues have been grouped into poor borehole capping and sealing practices (17 instances), poor rehabilitation practices (11 instances), and poor environmental management practices (25 instances).

Key issues related to:

- failure to maintain adequate records of borehole sealing and/or capping
- failure to cut casing below ground level leaving uncapped casings above ground level (Photo 1)
- lack of, or inadequate, erosion and sediment controls on drill sites (Photo 2)
- poor bunding and/or poor chemical storage and handling practices (Photo 3)
- poor topsoil management practices (Photo 4)
- lack of, or poor, water management controls during drilling (Photo 5)
- failure to undertake rehabilitation in a timely manner (Photo 6).

Issues associated with the technical management of exploration activities accounted for 19 of the identified non-compliances and observations of concern. These issues primarily related to failure to notify changes to the nominated technical manager, or failure to demonstrate that the nominated technical manager had supervised and approved the exploration reports. It was noted that these requirements are not included in the current standard title conditions (based on the outcomes of the improved management of exploration regulation (IMER) project), and hence the frequency of this type of non-compliance will reduce as titles are progressively renewed with the revised IMER conditions.

It was noted that most of the smaller mineral explorers do not have any systems in place for compliance management and in some cases, the titleholders were simply not aware of their obligations. The audit team recommends the development of guidance material on identifying and interpreting compliance requirements to assist in reducing the number of non-compliances in this area.

## 2.2 Mining audit findings

### 2.2.1 General summary

Of the 10 audits undertaken of mining operations, two were in the coal sector and eight were in the mineral sector. Of the eight audits in the mineral sector, one was currently in care and maintenance, and one site had moved to closure.

An overall summary of the performance of each sector is shown in Table 2:6.

As with exploration, it was observed that average rates of non-compliance were generally lower for coal mining when compared to mineral mining. The average non-compliance rate for coal mining was found to be 4.5%, whereas for mineral mining the average non-compliance rate was found to be 8.9%. Overall the non-compliance rates varied from 3.2% to 16.6%.

Table 2:6 Overall summary of mining compliance performance

Auditee	ND	NA	C	NC1	NC2	NC3	O	Total
Care and Maintenance	4	45	15	0	0	10	8	82
Closure	37	79	154	0	5	4	4	283
Coal Mining	0	111	241	4	3	10	8	377
Mineral Mining	228	695	1229	0	48	174	132	2506
<b>Total</b>	<b>269</b>	<b>930</b>	<b>1639</b>	<b>4</b>	<b>56</b>	<b>198</b>	<b>152</b>	<b>3248</b>

## 2.2.2 Key issues

### Coal

Both of the coal mining operations audited were noted to have an approved mining operations plan (MOP) in place; however there were several instances where the commitments made in the MOP were not being implemented on site, for example, reports being submitted to the regulator on a quarterly basis rather than the monthly basis specified in the MOP.

There were three instances of failure to lodge or late lodgement of compliance reports or annual rehabilitation reports; however it was generally noted that annual environmental management reports (AEMR) had been submitted. It is likely that this issue arose due to some of the titles comprising the mining operations having updated conditions imposed during renewal, resulting in some titles requiring AEMRs and other titles requiring compliance reports and rehabilitation reports, depending on the standard conditions in use at the time of the renewal.

Given the very low number of audits undertaken in the coal mining sector, and the fact that both mines were owned by the same titleholder, further audits would need to be undertaken to identify any trends in compliance within this sector.

### Minerals

The range of issues identified in mineral mining is summarised in Table 2:7. Where mining operations included adjacent exploration licences, the audit also included a sample of exploration activities, hence the exploration related issues identified in the table.

Failure to carry out operations in accordance with an approved MOP represented almost half (46%) of the non-compliances and observations of concern identified during audits of mineral mining operations. Furthermore, at two of the audited premises, it was found that there was no approved MOP in place.

Previous versions of the MOP conditions, and MOP guidelines prepared by the department, have required information on managing the various environmental issues associated with mining operations. In many instances, the MOPs that are prepared by mining companies make reference to and/or include the various management plans required by the conditions of project approvals issued by the Department of Planning and Environment. Failure to comply with these management plans therefore becomes a failure to comply with an approved MOP, despite the fact that many of these management plans are for issues that are generally beyond the regulatory scope of the Mining Act (for example, archaeological issues, or threatened species issues, which are more appropriately regulated by Department of Planning and Environment).

The Division of Resources and Energy's Environmental Sustainability Unit issued revised MOP guidelines in September 2013 which focus more upon the environmental risks associated with mine

rehabilitation and closure. It was also noted that recent MOP approvals have been limited to the rehabilitation aspects of the MOP.

Table 2:7 Issues identified in mineral mining audits

Issue category	Number of occurrences
<b>Care and maintenance</b>	
Failure to have approved MOP for operations	2
Failure to lodge or late lodgement of annual environmental management report	2
Failure to lodge or late lodgement of annual exploration report	6
Failure to meet labour and expenditure conditions	1
Failure to obtain approval prior to suspending mining operations	1
Failure to pay or late payment of rents and levies	2
Miscellaneous	1
Poor environmental management practices	1
<b>Closure</b>	
Failure to carry out operations in accordance with approved MOP	4
Inadequate storage and management of chemicals, fuels and oils	3
Miscellaneous	3
<b>Exploration</b>	
Failure to complete nominated work program	3
Failure to comply with conditions of exploration approvals or REF commitments	17
Failure to lodge or late lodgement of annual environmental management report	1
Failure to lodge or late lodgement of annual exploration report	3
Failure to meet labour and expenditure conditions	3
Failure to obtain co-operation agreements with overlapping titleholders	2
Failure to provide environmental management report at renewal	1
Miscellaneous	4
Poor borehole sealing or capping practices	2
Poor consultation or complaint management practices	15
Poor environmental management of exploration activities	1
<b>Production</b>	
Failure to carry out operations in accordance with approved MOP	141
Failure to lodge or late lodgement of annual environmental management report	9
Failure to lodge or late lodgement of annual exploration report	13
Failure to lodge or late lodgement of compliance report	1
Failure to meet labour and expenditure conditions	4
Failure to notify DPI Water of drilling activities	1
Failure to pay or late payment of rents and levies	6
Failure to pay or late payment of royalties	1
Failure to prepare subsidence management plan or reports	1
Failure to report environmental incidents	4

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Issue category	Number of occurrences
Inadequate storage and management of chemicals, fuels and oils	3
Miscellaneous	20
Poor environmental management practices	36

## 3. Joint audit program on mine dams

In May 2016, the Environment Protection Authority (EPA) proposed to undertake a compliance audit program on mine dams including sedimentation dams, wastewater holding dams and tailings dams. This program was proposed to be undertaken as a joint compliance audit program with both Department of Planning and Environment and the regulator. Fourteen mines were included in the joint audit program, which was undertaken between September and December 2016.

### 3.1 Audit scope

As there is considerable overlap between the obligations contained in mining operations plans and the management plans required and approved by Department of Planning and Environment, the regulator's focus for the joint audit program involved reviewing and assessing compliance against the safety management requirements for mine dams.

Specifically, the regulator's scope included:

- A review of the rehabilitation progress at each site and the ability of rehabilitated areas to reduce the water and sediment loading to dams on site.
- A review of any principal hazard management plans related to dams on each site (for example, plans for inrush or inundation).
- A review of the mine's safety management systems in relation to management, monitoring and maintenance of dams.
- A review of any high risk activity notifications or emplacement area approvals, and associated documentation, related to emplacement areas for coal mines.
- An assessment of the level of on-site implementation of risk management controls and management strategies in relation to management, monitoring and maintenance of dams. This included an assessment of compliance against the obligations contained in any relevant management plans pertaining to the management of dams on site.

The scope did not include any technical assessment of the engineering design or construction of dams, however where any issues of concern in this regard were identified during the audit, these issues were referred to the regulator's Mine Safety Unit for further investigation.

### 3.2 Audit criteria

The audit criteria against which the operational performance was assessed included:

- The requirements of *Part 2 Managing risks of the Work Health and Safety (Mines and Petroleum Sites) Act 2014* as they relate to the operation and maintenance of dams, specifically:
  - Division 1, Subdivision 1 Control of risk
  - Division 1, Subdivision 2 Safety management system
  - Division 2, Subdivision 1 Identification of hazards
  - Division 2, Subdivision 2 Principal hazard management plans
  - Division 6, Subdivision 1 Emergency plans



- Commitments made by the mining company in documents pertaining to the operation and maintenance of dams, including:
  - Operations and maintenance manuals
  - Dam safety emergency plans

### 3.3 Operational performance summary

The overall findings of the dam safety management system audits are summarised in Figure 3:1.

As part of the program, the regulator identified a total of eight non-compliances and 54 observations of concern. A further eight suggestions for improvement were also noted. What these non-compliances, observations of concern and suggestions for improvement were issued for is summarised in Figure 3:1.

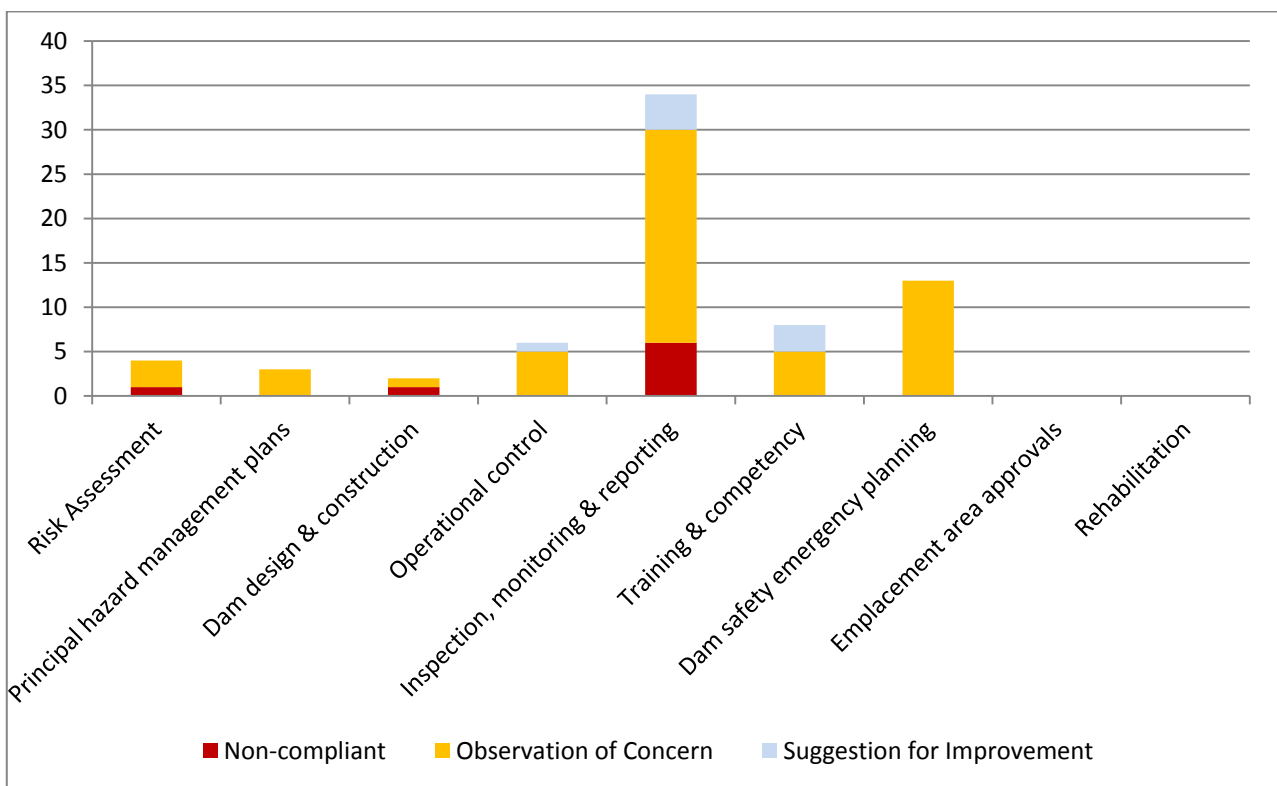


Figure 3:1 Non-compliances, observations of concern and suggestions for improvement

## 3.4 Key findings

### 3.4.1 Risk assessment

Thirteen of the 14 sites audited had undertaken reasonably comprehensive risk assessments which included the operation and maintenance of dams on site. Only one site did not have any evidence of a documented risk assessment which included dams but it was noted that this site was progressing risk assessments at the time of the audit.

A review of the risk assessments undertaken showed that on some sites, the documented controls to be implemented would not address the identified risk. For example, one site had identified a risk of less than adequate dam design and construction; however the documented risk control was listed as 'water management plan'. A review of the water management plan did not identify anything that would relate to the adequate engineering design and construction of dams on site. In this situation, the identified control would not be effective in mitigating the risk. It would be more appropriate for this risk to have controls such as engineering standards to be applied in design, or construction to be supervised by a qualified and experienced dam engineer.

Four mines were observed to have very comprehensive risk assessments in place for all dams on site with appropriate risk controls identified. These risk assessments had generally been undertaken at a corporate level and appeared to have been undertaken in response to recent high profile dam incidents both nationally and internationally.

### 3.4.2 Principal hazard management plans

Two of the mines audited had undertaken a broad brush risk assessment which included the operation and maintenance of dams but had not completed a specific risk assessment for inundation and inrush, and consequently had not determined whether this represented a principal hazard or not. It was noted that under the savings and transitional provisions of the WHS (M&PS) Act, each site had until February 2017 to have its inrush management plan prepared.

Several mines were noted to have prepared principal hazard management plans for inundation and inrush following completion of their risk assessments. It was noted that some open cut mines had very detailed inrush and inundation management plans prepared. However, it was noted during discussions with site personnel that there appeared to be a lack of understanding on the need for an inrush and inundation risk assessment particularly for open cut mines and surface operations, and the preparation of an inrush and inundation management plan should any significant inrush or inundation risks be identified.

At two open cut sites, it was noted that the completed risk assessments had identified the potential for loss of life in the event of a dam wall failure. Based on the meaning of 'principal hazard' outlined in Clause 5 of the WHS (M&PS) Reg, it is considered that those particular dams should be considered as potential inundation and inrush sources and, based on the risk assessment undertaken which had identified the potential for loss of life, an inrush and inundation management plan should be prepared. It was noted that neither site had prepared such a plan.

### 3.4.3 Dam design and construction

Generally evidence was sighted to indicate that dam design is undertaken by suitably qualified dam engineers. For prescribed dams, it was also noted that designs had been submitted to the Dam Safety Committee as required.

Construction of prescribed dams was generally noted to have been undertaken by civil contractors supervised by suitably qualified civil engineers. Construction reports were generally available for prescribed dams and were noted to have been submitted to the Dam Safety Committee as required.

For dams other than prescribed dams, it was noted that there was generally a lack of design and construction documentation available, although most dams inspected appeared to have been constructed in a reasonable manner. However, one dam inspected during the audit program was observed to have been constructed to standards below what would normally be expected.

For this dam, the dam wall appeared to be sloping such that on the lower side of the wall, there was insufficient freeboard (Photo 1). This issue was referred to the Mine Safety Unit and, upon further inspection by the Regional Inspector of Mines, a notice was issued requiring remedial works to the dam.

### 3.4.4 Operational control

The Australian National Committee on Large Dams (ANCOLD) published the Guidelines on Dam Safety Management (August 2003) which is generally considered to represent best practice in relation to the management of dams. These guidelines identify that dam safety and surveillance programs should generally be included in the contents of an operation and maintenance manual.

Whilst most mines audited did have operation and maintenance manuals for their prescribed dams, and water management plans that generally related to other dams on site, it was identified that these manuals and plans did not always reflect the actual operational regime of the dams on site. It was also identified that these manuals did not always document the inspection and monitoring requirements for the dams.

For example, a surveillance report for a dam at one mine had indicated that the maximum operating level of the dam should not exceed a level 2.8 metres below the spillway invert. This requirement was not included in the operation and maintenance manual for the dam, and at the time of the audit, it was observed that the dam was operating at a higher level than the maximum operating level recommended.

In another example, it was noted that water levels in the dam were surveyed by the mine surveyor on a weekly basis. It was further noted that there was a network of piezometers around the dams which were monitored on a monthly basis. Neither the water level surveys nor the piezometer monitoring were included in the operation and maintenance manual for the dams.

Given that inspection and monitoring are the key risk control measures proposed by most mines for the risk of dam wall failure, it is important that monitoring and inspection regimes are documented, and are understood and implemented by dam operators. It is also imperative that the dams are operated in accordance with the documented requirements of the manual.

It was noted that one mine site had adopted the innovative practice of installing solar powered automatic water level sensors and webcams on its sediment dams as a means of being able to easily ascertain the status of any sediment dam at any time, without the need for operators to be out manually reading water level gauges in severe weather. The webcams also provided the facility to be able to confirm any alerts issued by the water level sensors. The webcams automatically captured a still photograph every 30 minutes which was stored as a record of dam water levels along with information from the water level sensors.

### 3.4.5 Inspection, monitoring and reporting

Inspection, monitoring and reporting was the most common issue for non-compliance, observations of concern and suggestions for improvement. Only two mines audited were able to demonstrate that effective inspection, monitoring and reporting processes were in place.

For the other 12 mines, six non-compliances, 24 observations of concern and four suggestions for improvement were identified. The key issues arising from the audit findings related to:

- inspection and monitoring not being undertaken at the locations and frequencies as specified in the operation and maintenance manuals
- routine inspections not being documented

- routine inspection checklists not always being completed or inconsistent recording of information on checklists
- ineffective inspection processes
- monitoring instruments and devices not always being adequately maintained
- failure to action recommendations from surveillance reports.

These issues are discussed in more detail in the following sections.

## Inspection

Only one mine had no documented inspection process – inspections were reported to be undertaken but these inspections were not documented. For all other mines audited, routine inspections were generally documented on inspection checklists, although it was noted that at some mines, these checklists are not always completed at the frequency documented in the operation and maintenance manual. For example, at one mine, completion of the daily checklist relating to the tailings storage facility was only completed 15 times in a sample of 27 daily checklists reviewed during the audit. At another mine, the operation and maintenance manual specified that routine inspections were to be undertaken three times per week; however a review of a sample of the weekly inspection checklists showed that there were at least four weeks where the inspections had only been completed twice weekly.

The inspection process is integral to identifying and rectifying any issues associated with the safe operation and maintenance of the dam, and inspection frequencies are generally specified by the dam engineers in response to the nominated consequence category of each dam. For inspections to be effective in mitigating the risk of serious dam wall failure, the inspection process needs to be undertaken at the specified frequencies, with documented inspection checklists or reports being maintained.

Another key issue in relation to routine inspections was the inconsistent recording of information on the inspection checklists. For example, at one mine site, the daily tails dam inspection sheet included an item labelled 'Operational freeboard (at wall)'. Some inspectors had left this checklist item blank; some commented 'Good' or 'Okay', while others had recorded the actual freeboard level (e.g., 0.5 metres). The annual surveillance reports for this facility concluded that provided the specified freeboard criterion is maintained, the dam could be operated safely. Given this conclusion, it is critical that accurate information on the freeboard level be recorded and maintained.

Although most mines are undertaking and documenting routine inspections, issues identified during the audit at some mines has raised concerns that inspection processes at some sites were not very thorough and may not be effective in identifying issues associated with the operation and maintenance of dams.

For example at one site, it was noted during the audit site inspection that a large tree had fallen across the spillway of one dam, effectively blocking the spillway (Photo 2). However, a review of the inspection checklists for the week prior to the audit showed that this had not been picked up during the routine inspection process; hence no action had been taken to remove the tree. It was noted that each of the checklists reviewed had the 'Spillway obstructions' box ticked as 'okay' with no actions required. At another site, a movement survey monument on one dam was observed to have been damaged, while a water level gauge board in another dam had fallen over such that it would not be able to be used for water level gauging (Photo 3). Neither of these issues appeared to have been identified in the routine inspections, and consequently no corrective actions had been initiated.

These issues show that not only must the inspection process be documented; inspectors must be trained in how to effectively complete and document the inspections they undertake. Where corrective actions are identified, these must be recorded, actioned, and closed out in a timely manner.

## Monitoring

Most mines have established monitoring programs for dams with monitoring that includes:

- piezometers (Photo 4) with water levels recorded on a regular basis
- regular surveys of movement survey prisms or monuments (Photo 5)
- water level monitoring either through electronic water level sensors (Photo 6) or manually read gauge boards (Photo 7).

The key issue identified with monitoring programs was that monitoring is not always undertaken in accordance with the program described in the operation and maintenance manual. If the monitoring regime is amended for any reason (e.g. as a result of a surveillance report recommendation), then the operation and maintenance manual should be updated to reflect the change.

At two mines, surveillance inspections by dam engineers had recommended additional monitoring equipment is installed (e.g. additional piezometers or monitoring survey prisms); however, it was noted during the audit that such additional monitoring had yet to be installed.

The inspection and maintenance of monitoring equipment was also identified as an issue. At several sites, the auditors observed damaged gauge marker boards and survey prisms, and at one site a monitoring probe was observed lying in the grass adjacent to a seepage monitoring well. For the monitoring programs to be effective in identifying potential issues with the dam structures, it is important that any monitoring equipment installed is regularly inspected and maintained.

## Surveillance reporting

Twelve of the mines included in the audit program had prescribed dams under the Dam Safety Act on their sites. It was noted that each of these mines had generally undertaken surveillance inspections and reporting at the frequencies required by their respective consequence categories. Evidence was sighted to indicate that these surveillance reports had been submitted to the Dam Safety Committee as required.

One of the two mine sites which had no prescribed dams had opted to treat its dams as if they were prescribed based on the results of the risk assessment that had been undertaken. For this site, annual dam inspections were undertaken of each dam on site by a qualified independent external dam engineer and an annual surveillance report prepared generally in the format of a Type 3 surveillance report under the Dam Safety Committee guidelines.

Although the mines were undertaking the surveillance inspections and reporting, the key issue appeared to be in the recording, actioning and tracking of recommended actions. Very few sites could demonstrate timely implementation of surveillance recommendations with some surveillance reports repeating recommendations the following year after no actions were taken.

## Corrective actions

An effective dam safety management system needs to have systems in place to record, track and close out corrective actions.

All of the mines audited were found to have systems in place for logging and tracking corrective actions (e.g. CMO or INX or similar). However, in many cases, these systems were not being utilised to record and track issues raised during either routine dam inspections or surveillance inspections. Some mines had separate spreadsheets for recording and tracking actions, however these were not routinely monitored and there was no process for escalation if issues were not addressed in a timely manner.

As a result, several mines had not actioned recommendations from surveillance reports, and in some cases, actions had remained outstanding for almost two years.

### 3.4.6 Training and competency

Both the ANCOLD Guidelines on Dam Safety Management (August 2003) and the Dam Safety Committee guidance sheet DSC3G identify that personnel involved in the operation and inspection of dams should undertake relevant training in dam safety management, with this training to be refreshed every five years. For five of the mines audited, staff involved in undertaking the dam inspections had either not undertaken appropriate dam safety training at all, or had undertaken such training more than five years ago.

Most mines included in the audit program did have systems in place for managing training and competency; however it was noted that not all mines had specifically identified the training and competency requirements for inspecting and/or operating the dams. Consequently, 33% of the mines audited did not have appropriately trained staff undertaking the dam inspections.

### 3.4.7 Dam safety emergency planning

Best practice for dam safety emergency plans is generally considered to be outlined in the ANCOLD *Guidelines on Dam Safety Management Systems* (August 2003), and Dam Safety Committee guideline DSC2G (June 2010) *Emergency Management for Dams*. The ANCOLD guidelines state that it is essential that the dam safety emergency plan (DSEP) be tested periodically by conducting a drill simulating emergency conditions. ANCOLD recommends a drill be conducted at least once every ten years for high and significant category dams.

The DSC2G guideline states:

*For DSEPs to remain effective it is imperative that they be regularly updated and tested. In this regard, the DSC requires DSEP's to be updated annually, and to be reviewed and tested at least once every five years with actions in this regard to be reported in surveillance reports for each dam.*

Clause 93 of the WHS(M&PS) Reg requires the operator of a mine to test the emergency plan for the mine at intervals of no more than 12 months.

Dam safety emergency planning was the second most common issue for the number of non-compliances, observations of concern and suggestions for improvement. Although evidence was generally sighted to confirm that all mines are testing their general emergency management plans at regular intervals (usually annually), it was noted that over half of the dam safety emergency plans had not been tested in the last five years.

Three mines were noted to have undertaken actual DSEP drills, with another two mines completing desktop exercises. One mine provided evidence that its notification and evacuation process with community members was tested on an annual basis to confirm that correct neighbour details were recorded and that the method of messaging was being received and understood. Other mines had contact details for potentially affected neighbours recorded in their dam safety emergency plans;

however, it was noted that there was no process in place to review and confirm these contact details on a regular basis (e.g. during an annual review).

The DSC requires dam safety emergency plans to be updated annually for all prescribed dams. For five mines, no evidence was sighted to indicate that the DSEPs are reviewed or updated on an annual basis, and it was noted that for these five sites, the DSEPs did not always reflect the organisational structure or current status of the dam. For example, for one mine, the consequence category for a prescribed dam had been amended, however this was not reflected in the DSEP. Similarly, there were three mines where the organisational structure or personnel had changed, which may impact on the roles and responsibilities for dam safety management; however the DSEPs had not been updated to reflect the changes.

### 3.4.8 Emplacement area approvals

Emplacement area approvals are only relevant to coal mines and hence, were not applicable to any of the industrial and metallic mineral mines in the audit program. Generally, where emplacement area approvals were current for the coal mines audited, the conditions of the approvals were generally being met.

# Photo Plates





**Photo 1 – Casing protruding from the ground on a rehabilitated borehole site**



**Photo 2 – Sediment fencing in need of maintenance on a drill site**



**Photo 3 – Bund drain left open discharging potentially contaminated water**



**Photo 4 – Topsoil stockpile at a drill site – note no sediment controls and weed infestation**



Photo 5 – Groundwater leaking from a borehole



Photo 6 – Unrehabilitated drill site – drilling was completed in early 2016



**Photo 7 – Inadequate dam wall construction with no operational freeboard and a noticeable low point in the dam wall**



**Photo 8 – Fallen tree blocking the grassed spillway on a sediment dam**



Photo 9 – Damaged gauge marker board on a major water storage at one site



Photo 10 – Example of automatic monitoring piezometer installed on a dam wall



Photo 11 – Example of movement survey prism on a dam embankment



Photo 12 – Example of solar powered automatic water level sensor and webcam installed on a sediment dam



Photo 13 – Example of manually read gauge marker boards in a tailings dam