

Training new professionals, Providing a clear & comprehensive path forward for Employer and Employee

The current mining boom has sparked a shortage of professionals, particularly geologists, within the mining industry and it is a trend currently being experienced at George Fisher Mine. The cyclic nature of the mining industry, from bust to boom, has also meant that experienced geologists are particularly hard to come by and most advertisement calls are answered by graduates. This places an increased focus on training not only to build skills as a geologist but to ensure a healthy emphasis on safety in what can be a hazardous environment – an underground mine. This paper will focus on the process undertaken at George Fisher Mine to implement a training program for mine geologists, an endeavor that is on going. It will highlight the transient nature of the geology group and how we aim to provide a quality training program in an environment where it is a challenge to retain geologists for more than 12 months and where the experience of the current group largely lies in the 0-3 year range.

Introduction:

George Fisher Mine (GF) is located approximately 22 kilometres north of Mt Isa, in North West Queensland. An underground mine producing base metals zinc, lead and silver, it has an annual production rate of 2.6 million tonnes from the two very distinct sections of the mine known as George Fisher North (GFN) and George Fisher South (GFS). GF is positioned in a complex geological environment that demands intense geological knowledge in order to support such a high production rate.

As a result GF has a relatively large geology team consisting of 17 Xstrata personnel (staff and EBA) and from 4 – 7 contractors at any given time. The geology department is broken down into several areas, one of these being the short term geology group (STGG). The STGG works in conjunction with operations to look after the day to day production in all sections of the mine. As a reflection of the mine being separated into two distinct areas, the STGG is also separated into two groups of mine geologists. Whilst there is sharing of ideas and work practices between the groups they largely work autonomously, interacting with underground crews, engineers and rock mechanics that also are designated to an area, either GFN or GFS.

Working as a mine geologist at GF is a demanding role. Being a residential site the working roster for mine geologists is a 5 days on 2 days off working week, with a standard 10 hour day (7am to 5pm). In addition there is an on call roster for weekend coverage which involves all mine geologists. It is rare for the on call geologist not to be called out to the mine site for one day each weekend. On a whole the STGG provides day shift coverage to GF 365 days a year.

An Insight into the Mine Geology Role:

The mine geologist's role within the STGG is a demanding one. It is fair to say that not all people are suited to this type of high work rate environment, and some people find it difficult to deal with. It is a role where good time management skills are imperative, and each individual needs to be able to prioritise tasks and shift quickly between them. It is a role where not every day is able to be planned out based simply on the on going work load. It requires individuals that are able to work well in a team environment as well as on your own, and build good working relationships with other departments.

Within the STGG sub-groups for GFN and GFS, each one has a designated mine geologist for the underground duties, this is normally rotated within the group on a monthly basis. The designated geologist for underground is required to liaise with operations surface and underground personnel on a day to day basis and will spend approximately half to two thirds of each day underground themselves. The rest of the day is spent communicating information on how production sources are performing and providing geological information to other departments to ensure they are utilizing all appropriate data for their tasks. This may be in the format of spreadsheets that are maintained on a daily basis, or 3D objects generated in mining software.

A Diverse Group:

The mine geologists that make up the STGG at GF are a diverse bunch! The group largely consists of geologists with 0 -3 years experience with a small number in the 3-5 year range and a senior geologist with 10+ years experience, as shown in Table One. The total experience of the group is approximately 30 years, an improvement on what has been seen in the past where all mine geologists were graduates.

Whilst the range of experience is somewhat limited the age of the group is more widely spread. Recruitment of (experienced geologists and) graduates has in the last two years been dominated by mature age students (28-34). This brings the age spread of the entire work group to between 25 and 35.

Experience	%	Age Group
0-3 yrs	62%	25-35
3 - 5 yrs	25%	25-28
>10 yrs	13%	>35

Table One: Figures are based on current staffing levels of 8 personnel including the Senior Geologist. With the 2007 intake of graduate geologists the experience within the 0-3 year range will increase to 75% of the Short Term Geology Group.

What makes the STGG more unique is that it has a 50:50 ratio of males to females, a statistic that is rarely seen on a mine site. What is not reflected by the age group is that there are only 2 personnel within the STGG that have a family. It has been seen in the past that due to the demanding nature of the mine geology role it is a difficult to maintain if you are the primary carer for a family unit.

Recruitment – An on going Process?

“Stability within our workforce gives our people a bit of a break from continually having to train. (This mine site is) already very lean. So any vacancy puts a load on the people who remain.” (Breach, Brereton and Cliff, 2002)

The STGG at GF is currently under staffed. There are 10 allocated staff positions for the STGG including the senior geologist. The break down is GFN to have 5 mine geologists and GFS to have 4, as shown below in Figure One. Currently the GFN group has three staff and one contract geologist, a marked improvement from 2 which was the case less than 2 months ago. The GFS work group currently has 3 geologists one less than is allocated. Currently there are 4 graduate positions allocated to the STGG for the graduate intake January 2007.

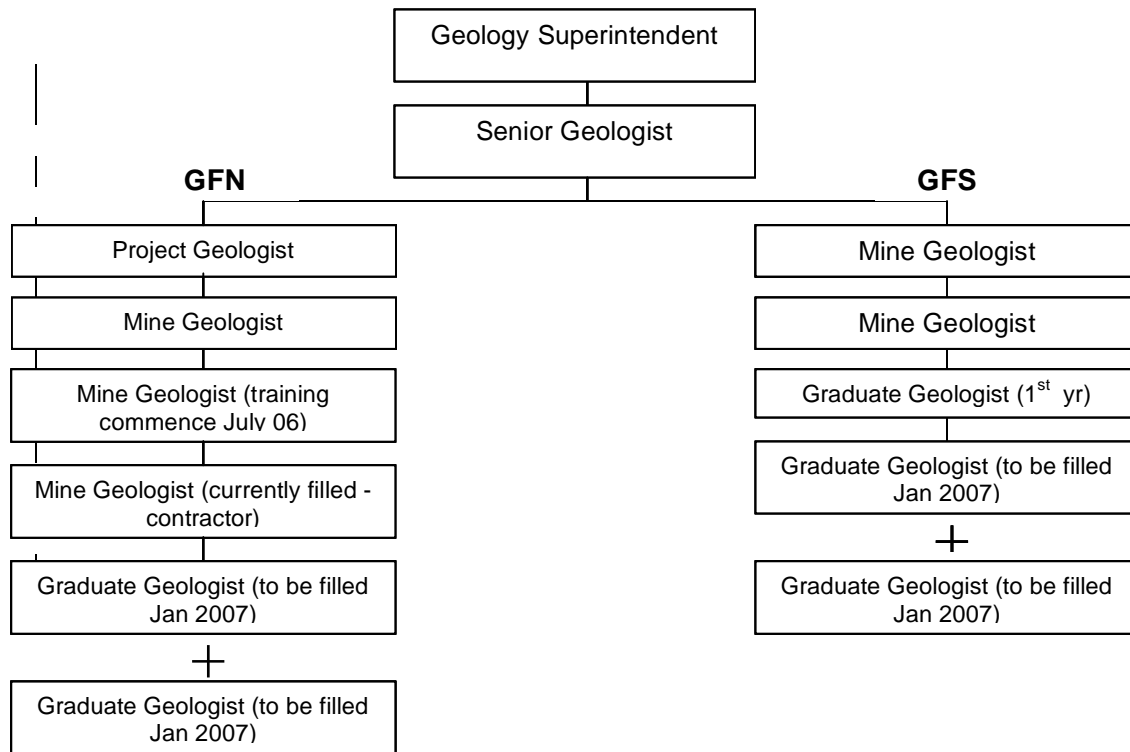


Figure One: Organisational flowchart of the Short Term Geology Group.

In the current employment climate of the mining industry boom, recruitment is an ongoing process for the STGG at GF. This is a reflection of both the difficulty of attracting personnel with the qualifications and experience to fulfill the designated role and the cyclical nature of the group itself. With the large number of opportunities currently available for geologists in the mining industry, the demand for geologists is driving wages up and the experience required to gain a senior role down, it is making it more difficult for companies to retain staff for extended periods of time. This has been seen particularly in the last four years at GF where in the STGG there have been resignations after only 11-18 months with the group. This comes with a significant cost to the company.

Adding to the difficulty for GF to attract new personnel is the fly in/fly out (FIFO) option versus the residential working environment. Younger people working in the mining industry tend to favour FIFO which enables them to maintain a lifestyle based in a capital city. In addition rosters for FIFO have improved significantly in response to the need to attract personnel, from 2 weeks on 1 week off which was the industry standard to 8 and 6 (8 days on 6 days off) or even 7 and 7 (7 days on 7 days off). The isolation of Mt Isa and the associated hardships are consistently the main reasons that affect retention of staff at GF. The average length of tenure for the STGG is shown in Figure Two.

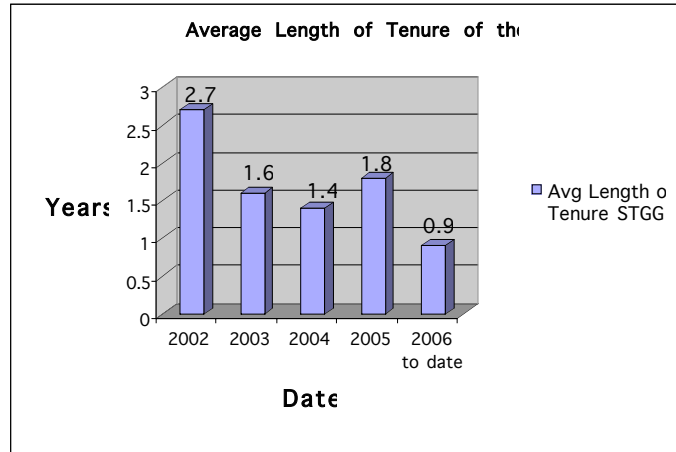


Figure Two: The Average Length of Tenure for the STGG from 2002 to current.

Recruiting is a process that requires not only HR resources but input from professionals within the geology team. It is the responsibility of the senior geologist and the geology superintendent to review all resumes in order to decide if a candidate meets the requirements to gain an interview. Following this, if the interview is favorable reference checks are performed, again by the senior geologist and the geology superintendent. From here if the candidate is deemed suitable a site visit will be organized. The current trend being that they are accompanied by a partner and possibly children depending on the individuals circumstances. It must be remembered that several individuals can go through the process outlined above before a suitable candidate is chosen for a site visit. An example of this is the selection process undertaken for graduate recruitment. To fill two graduate positions for the 2007 intake 60+ resumes were reviewed. From this list 12 candidates were chosen for phone interviews and had reference checks completed. Four candidates were short listed for a site visit (one with partner) and two positions will be offered.

A site visit itself requires additional geology resources. The individual will be taken on an underground tour and must be accompanied on the mine site at all times. From here a decision is made whether to offer the individual a position. If the individual is not offered a position or chooses not to accept the position, this process has come at a large cost to the company with no reward. If the offer is accepted the training process begins as soon as the new employee arrives on site. Overall, to successfully fill an advertised position can take months during which time there is significant drain of resources from the geology group.

Compounding this is that in the past the GF geology department has been seen by many people as a training ground for mine geologists. This has been fed largely by the demanding nature of the mine geologists role which means that in order for the group not be left in a position where if a certain member resigns there is a gap in the required skill set, every member learns how to complete all tasks. This results in a wide range of skills and experience being learnt and gathered in a short period of time, creating individuals that are considered by the industry to be very employable.

It is rare for the STGG at GF to maintain set staffing levels for any length of time. This creates a two fold problem where by staff that are present and are already carrying a large workload get bogged down by the additional work and the seemingly no light at the end of the tunnel. This can cause further loss of staff and the department begins to resemble a revolving door. As shown in Figure Three in the last five years the STGG and the Geology Department have experienced alarmingly high staff turnover rates.

Whilst recruitment seems to be the only answer it must be remembered that training also is a significant drain on what is often already depleted resources. The STGG group has consistently run below establishment, as low as 40-60% within the last 6-8 month period, this is taking into account annual leave, sick leave and training work where staff are off site. The arrival of new employees virtually removes a mine geologist from normal duties full time in order to provide

training and this can last up to 3 months, reducing the effective establishment of operating geologists to as low as 30% during this period. On going training can occur for up to 12 months until the trainee reaches full production potential and starts adding value to the group. This can create a scenario where the more experienced geologists spend a majority of their time as trainers, not geologists. An effect of high turnover of staff that is difficult to place a dollar value on the brain drain. This is where the loss of experienced geologists has a negative impact on the group not only due to increased workload but by losing a member of the group that has background history of the work area and is knowledgeable in how to complete work processes. A significant amount of time and training is required for a new staff member to reach this level of competency.

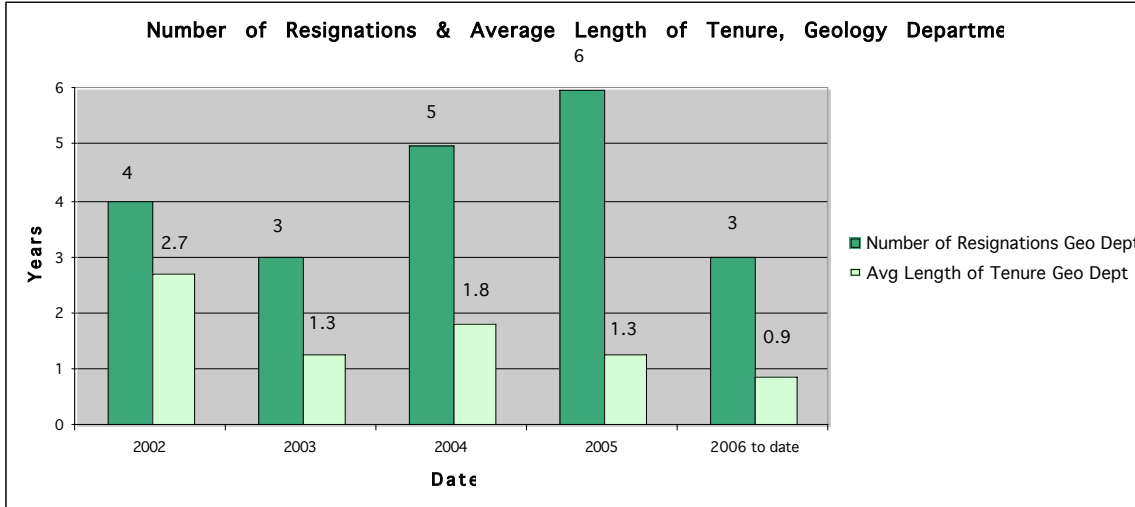


Figure Three; Graph One

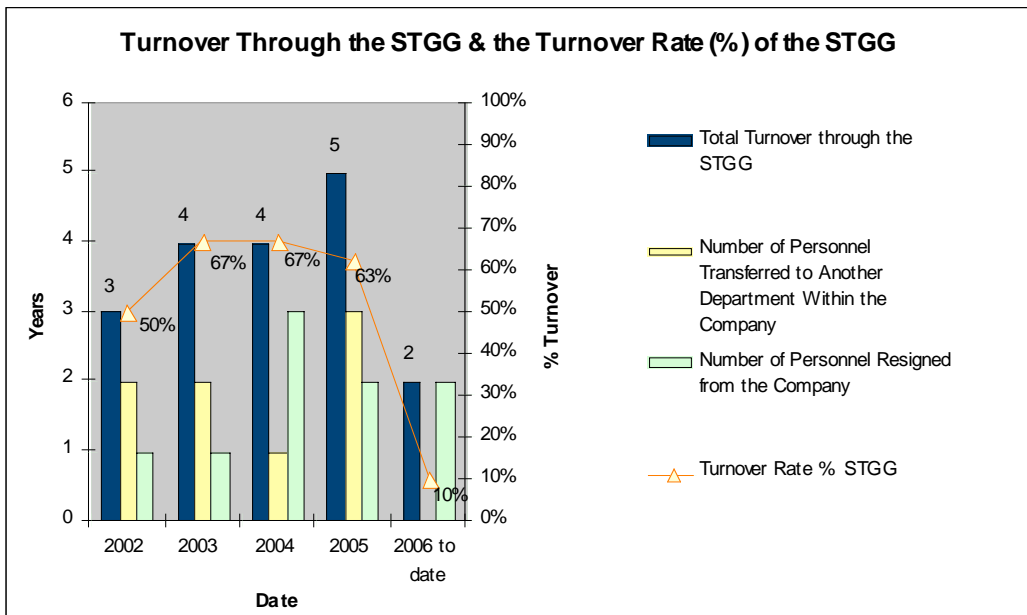


Figure Three; Graph Two

Figure Three: Graph one displays the Number of Resignations and Average Length of Tenure for the Geology Department from 2002 to Current. In contrast Graph Two displays the Turnover

of personnel through the STGG and the Turnover Rate (%) of the STGG over the same timeframe.

All of these factors combined create a situation where the company and the STGG are accruing considerable cost in order to reach and maintain desirable staffing levels in the STGG.

The Idea; to Implement a Training Plan:

“At four sites in the study HR managers reported frustration at their inability to implement effective strategies to reduce and contain turnover. At the sites that had achieved relatively low turnover management attributed this to a combination of....commitment to training and skills development” (Breach, Brereton and Cliff, 2002).

Due to the ongoing recruitment occurring within the STGG at GF and in order to ease the workload on the group during this time, it was proposed to design and implement a training plan. This would give not only the trainer direction and a breakdown of what knowledge needed to be imparted to the trainee, but also add structure to the training. An added benefit is that it provides a basis for more consistency in delivering the training which has as a result set a basic standard for training mine geologists in the group. Furthermore it has highlighted areas where procedures or work manuals are required or need to be updated, gave the group an opportunity to identify training tools that can be implemented prior to training, and offered an opportunity to include learning opportunities that were outside of the day to day grind but were things that would be useful when starting out in the mine geologist role at GF. These included spending time in other departments learning how they perform parts of their role and how that fits in with what the STGG is trying to achieve, it also provides a good basis for building work relationships. In addition it outlines areas where formal external training is required, such as a short course covering the use of mining software.

Several training tools were also put in place. The main one of these is what is referred to as the starters kit. It contains information on all data sources available to the mine geologist that can help them in their day to day tasks, where to find them and how they can be accessed. It also includes a breakdown of all spreadsheets that are maintained, including what data is required and in what format, and who the information should be forwarded to, as shown in Figure Four. For underground tasks a pocket size notebook was designed outlining what the mine geologist needs to record when inspecting production sources and development headings and a reminder for any specific safety points.

Xstrata Zinc - George Fisher Mine GFN Daily Geological Report - Development												
Shift Boss (12L crib) 4744 6615												
<input type="checkbox"/> Rebecca Trowbridge <input type="checkbox"/> Aulam Chapri (ext 6427) <input type="checkbox"/> Jacqueline Mascini (ext 6383) <input type="checkbox"/> Joe Fellows (ext 6210) <input checked="" type="checkbox"/> Karissa Greenfell (ext 6455)						<input type="checkbox"/> Chris Fletcher <input type="checkbox"/> Andrew Curd (ext 6365) <input type="checkbox"/> Mark Haydon (ext 6436) Geology Underground Office: ext 6622						
Heading	Level	Colour Status	Mark Up		Ore/Waste	PYRITE PREC.	Heading Status	Pb %	Zn %	Face		Maqing Wall OB or UB
			Previous	Today						OB%	Meas.	
H174 INCLINE	9C	Green Survey	Inspected 29-Nov-04	Inspected 14-Dec-04	Waste	Yes	to bore			5.9m	5.5m	UB 0.2m

Level No. →

Heading Name: as per the Survey Memo.

Ore/Waste ↑

Heading Status

- Green
Survey Can be driven without markup - survey control only
- Amber
Survey May be mined on back shifts without markup, but must have regular inspections (no more than 2 cuts without inspection) - survey
- Red
Geo Requires geological mark-up or inspection every cut, whether it be at the face or remote - geology control only

Figure Four: An example from the George Fisher Short Term Geology Group Starters Kit, displaying the breakdown of how to maintain a section of the Daily Geology Sheet which goes out to all areas of the mine.

Implementing a Training Plan:

The aim of implementing a training plan (TP) was to provide the trainee with a comprehensive framework of skills to be learnt and developed that can be worked through in a structured program. It provides a basis for the employer to highlight to the employee what skills they value, allows the employer to be open with any expectations it has on the employee, and enables the employer and the employee to have shared goals and easily monitor progress. It also highlights how each task leads on to the next, and how the skills learnt will be applied in the workplace. As a result the trainee can easily see how they are contributing to the group and the mine as a whole, creating a sense of achievement for the employee. As a new employee it is easy to under value just how much you have learnt in a new role, the TP acts as a visual reminder of how far the employee has progressed during their time with the company. This can provide on going enthusiasm for the employee and generates a sense of loyalty from the employee knowing that there is a set training program being invested in them by the company. The end result is improving skill retention for the company in the medium to long term.

An advantage of the training plan is it gives both the employee and the employer a clear path for discussion on poor performance, an often difficult task. Through regular sit down sessions with the trainer and the trainee with the training program it enables an environment for ongoing coaching and performance appraisal. This also ensures that the annual peer review process should be transparent based on training plan sessions through out the year.

The Training Plan:

The basis of implementing a training plan at GF is to identify what skills are highly valued by the short term geology group and to ensure all new employees receive the training required to gain and/or improve these skills. The TP is applied to each individual to identify the gap between the trainee's current skill level and the desired skill level. An important function of the TP is to outline the ideal flow of training and provide a sequence to the training.

The TP encompasses tasks from three main areas the employee will be exposed to; underground, office based and the coreshed. Once these areas were identified a comprehensive list of tasks was compiled covering all tasks the trainee will be expected to perform. The tasks are then broken down into a five stage learning system. Each stage of learning has a sign off to allow for tracking of progress and relates to the level of competency, as shown in Figure Five. The sign off process is driven by the trainee as a way of giving them ownership of the training process.

The five stages of the learning system are:

1. Reading appropriate procedure for the task
2. Shown how to perform task (in house training)
3. Can perform task with supervision or intermittent assistance, task is checked when completed (when applicable)
4. Can complete task without supervision (task may be checked when completed)
5. Ready for assessment (this is determined by the trainee)

All tasks that appear in the TP are assessment based. When the trainee is confident they can complete the task to the level required, they notify their supervisor they are ready to be assessed. Assessment is the final stage of the training plan process. Assessment can only be completed by a fellow staff member that has successfully completed the assessment component of a Certificate IV in Workplace Assessment and Training, through a recognised training practitioner.

Position: Mine Geologist										
Employee Name :			Pay Number :							
Start Date:		Review Date:			Next Review:					
<ul style="list-style-type: none"> The diagram below indicates the ideal flow of training for nominated position/role. Each title represents a training course, resource, licence, program or competency. Employee training plan will indicate training required to perform in the nominated position/role. Employee may receive training and competency in skills above their current role without organisational advancement. NOTE: Not all tasks will be completed to Stage 5 by the trainee, boxes containing are only completed to the stage indicated Pre-requisites do not include safety inductions/training or relevant operation notes 										
Stages of Training										
1. Read appropriate procedure for task										
2. Shown how to perform task (in house training)										
3. Can perform task with supervision or intermittent assistance, task is checked when completed (when applicable)										
4. Can complete task without supervision (task may be checked when completed)										
5. Ready for assessment (this is determined by the trainee)										
Stage					Underground	Procedure No. (if applicable)	Expiry	Date Competent	Assessed By	Comments
1	2	3	4	5						
					Stage 2; 4 weeks min					
					General Underground					
					Daily Geo Sheet					
					Liasing with Shiftbosses					
					UG time with Shiftbosses					
					Face Pictures & Markups (incl. Remote Markups)					
					Risk Assessments					
					Recall					
					Weekly Grades					

Figure Five: An example of the GF Short Term Geology Group Training Plan.

Not all tasks that appear in the TP are available to trainees to be completed to the final assessment stage. The training plan has scope for limiting the trainee's exposure to certain tasks until they are deemed to have the required knowledge and experience. For example it is deemed to be a safety concern for graduates to be representing the STGG at risk assessments without another geologist attending. Therefore their training plan will show that they can not proceed past stage 3 for this task until they are deemed to have adequate experience, this normally takes 6-12 months.

Accompanying the TP is a set of pre-requisites, which stipulate what basic tasks should be completed to a particular learning stage before the trainee is exposed to more advanced tasks, as shown in Figure Six. Unfortunately this is not always able to be followed, particularly with current staffing levels, and training can occur on an as needs basis out of sequence with the TP.

Pre Requisites:	
<ul style="list-style-type: none"> Pre-requisites assist in providing a logical progression for tasks in which training will be provided. Not all tasks will have pre-requisites – such as the basic underground and core logging tasks. It is assumed that tasks not included in this list do not require pre-requisites 	
Task	Pre-Requisites
Underground	
Daily Geo Sheet	<ul style="list-style-type: none"> Stage 2 General Underground
UG time with Shiftboss	<ul style="list-style-type: none"> 4 weeks General Underground
Weekly Grades (To Stage 2 ONLY)	<ul style="list-style-type: none"> Stage 3 PitRAM and Grades Sheet
Risk Assessments (To Stage 2 ONLY)	<ul style="list-style-type: none"> Stage 3 General Mining Stage 3 Xcut Inspections Stage 3 Face Pictures and Markups Stage 3 Stope/Bench Inspections

Figure Six: An example of the prerequisites as outlined in the training plan.

An advantage of the design of the TP is that it can be customized for geologists with a broad range of experience. The task list remains the same; however the time frames would be expected to be shortened for geologists with experience as compared to a graduate. It is also possible to include individual's specific projects or areas of particular interest where they would

like to gain experience. In the bigger picture this can assist the trainee in planning a career path within the company.

Once the TP has been put in place its progress is monitored by the geologist responsible for training and the senior geologist through sit down sessions with the trainee. This consists of going through each task the trainee has been exposed to since the last review and discussing their performance in relation to performing that task and what learning stage the trainee has reached in regards to that task. Also in this session a date will be set for the next review. These are normally kept to within a 3-6 month time frame, however it can depend on what tasks are going to be undertaken in this time. For example the initial underground training normally takes 3 months, so the next review can be based around the end of the underground time and commencement of office based duties. This keeps the trainee informed as to what training they should expect to receive and what tasks they will be exposed to when entering a different area of the workplace.

So where does safety come into all of this? Safety and the Training Plan:

All new employees that enter the GF mine site are required to complete a generic Queensland Mining safety induction. In addition to this there is a GF site specific induction that covers both surface and underground. However there is still a large amount of specific safety information that is required to be learnt on the job. To address this through the TP risk assessments and risk assessment training are included as individual tasks under each of the three main learning areas, and are also learnt using the five stage learning system. In conjunction with this, the STGG at GF has added several initiatives into the TP structure that incorporate not only building skills as a geologist but building safety knowledge and awareness. One of these is to spend time underground on shift with the underground crews. This has several benefits, particularly for geologists that have no or limited exposure to the underground environment, and the feedback has been overwhelmingly positive from geology and operations. From an operations perspective it makes new mine geologists more aware of how the crews work, what systems they use and how to conduct yourself around heavy equipment. This is a large safety aspect of the mine geologists role, not only being comfortable in the underground environment but conducting all tasks in a safe manner. A large aspect of the mine geologists role and the most dangerous is spending time in the underground environment. As a mine geologist you are entering another groups workplace. In order to perform basic jobs you are often entering areas where large machinery is operating. Simply by understanding what processes the other group utilises is a large step in making what you do not only safe for you but also for the people whose workplace you are entering. Basic functions such as ensuring you are visible to operators, communicating on the radio and obeying barricade and signs can assist in ensuring a majority of tasks are carried out safely.

Another source of safety training is the mine geologist that is the designated trainer. It is imperative that the trainer has a strong personal sense of safety, and is not afraid to let the trainee know if they are doing something they consider to be unsafe or they are not using best practice. Bad habits are easily transferred from trainer to trainee and it is up to the trainer to be conscious that they are not passing on any of their own bad habits. Two way communication is also important, the trainee must feel they are able to approach the trainer and ask questions particularly regarding safety issues. If the trainer is not sure of correct processes advice should be sought from other personnel. If the trainee feels they are unable to approach their trainer in relation to a safety issue they are able to seek out other opinions themselves and report back to the group. Another safety guard against this is whilst most training is provided by one designated person the trainee will spend time underground with other geologists also prior to them working unsupervised. This can assist in rectifying any safety issues. Sharing of safety information and ideas is encouraged at GF, particularly within the STGG.

Feedback:

An important component of training is feedback. This encompasses feedback to the trainer and the trainee to create a relationship through which both parties are learning together. As a trainer you should always be striving to improve yourself, not only the skills of the trainee. This has been

an important facet of implementing a training program at GF. As a result, for all processes that stem from the TP feedback is sought from the trainee. This occurs in several different forms. Some tasks such as time with the underground crews have a formal document for feedback from the trainee and the shift boss, which includes areas covering the trainees performance and allows for additional comments and ideas of how to improve the training initiative. In addition oral feedback is sought from the trainee at all stages of the training program, not only on the structure of the training itself but also on the trainer, which can facilitate continual improvement for the trainer. It is my belief that in order for the TP to remain as a dynamic and continually improving process constructive feedback is an important tool to facilitate this.

Moving Forward:

The training plan process is by no means complete! The next step is the design and implementation of assessments for all tasks that appear in the training plan.

Currently the training plan is being integrated as part of a specific program for graduates. The graduate program, the duration of which is two years, is a breakdown of this time into work areas. The graduate program involves exposure to more areas of the mine site, mostly in the form of short work periods encompassing crushing right through to smelting and the lab, to give the graduate an overview of how the entire mine site operates. The training plan takes this one step further by breaking down each of the work areas into what the individual will actually be learning whilst in that environment.

Other departments are looking at implementing training plans adapting the format that has been designed for the STGG. In the current employment boom shortage of professional staff has highlighted the need to invest in a comprehensive training program in areas such as planning and rock mechanics.

In the future the main aim for the GF STGG is to build a dynamic and effective team of mine geologists through utilizing a comprehensive training program that assists in the long term retention of staff, whilst creating a practical tool to safely manage the development of new employees.

Acknowledgements:

I would like to thank the Short Term Geology Group for embracing the idea of the Training Plan and assisting in its development.

References:

Beach, R., Brereton, D., Cliff, D., 2002, Workforce Turnover in FIFO Mining Operations in Australia: An Exploratory Study. Center for Social Responsibility in Mining, Sustainable Minerals Institute, The University of Queensland.