



FAR NORTHEAST TRAINING BOARD  
Mining sector employment and hiring forecast  
**2017-2027**



FAR NORTHEAST TRAINING BOARD (FNETB)  
your Local Employment Planning Council

COMMISSION DE FORMATION DU NORD-EST (CFNE)  
votre Conseil Local de Planification de l'Emploi



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your **Local Employment Planning Council**

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**COMMISSION DE FORMATION DU NORD-EST (CFNE)**  
votre **Conseil Local de Planification de l'Emploi**

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*This project* is funded in part by the Government of Canada  
and the Government of Ontario.

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The information presented in this report is current at the time of printing.

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## 1.0 EXECUTIVE SUMMARY

The Far Northeast Training Board (FNETB) has commissioned a mining sector employment and hiring forecast for the period of 2017-2027, for the FNETB catchment area as identified in Section 2.3 *Project Sponsor*.

Within the FNETB region there are a number of currently producing mines that have publicly announced closure:

- De Beers Victor diamond mine, scheduled for closure in 2019<sup>1</sup>
- Kidd Creek base metal mine, scheduled for closure in 2023<sup>2</sup>

A number of currently producing mines and advanced exploration sites have publicly announce expansion or startup activities:

- Goldcorp Century Project<sup>3</sup> and the Goldcorp Borden Lake Project<sup>4</sup>
- Iamgold Côté Project<sup>5</sup>

The goals of this mining sector employment and hiring forecast include:

- A projection of the total change in workforce requirement due to closures, expansions, and start-ups and the impact of workforce retirements.
- A projection of occupation specific workforce requirements, the impact of retirements on those occupations, and a quantification of the 'out of region workforce'.
- An identification of occupations of interest and the development of occupational profiles for those occupations.

The following participation rates were realized:

- Active mines: 9 of 9 mines provided workforce data (100% participation rate)
- Advanced exploration sites: 2 of 9 provided workforce data (22% participation rate)
- Mining suppliers: 52 of 150 provided workforce data (35% participation rate)

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<sup>1</sup> <http://www.cbc.ca/news/canada/sudbury/debeers-victor-closure-2019-1.4382977>

<sup>2</sup> <http://www.timminspress.com/2016/11/16/kidd-doesnt-foresee-extension-of-mine-beyond-2022>

<sup>3</sup> <https://www.goldcorp.com/portfolio/development-projects/century/default.aspx>

<sup>4</sup> <https://www.goldcorp.com/English/portfolio/development-projects/borden/default.aspx>

<sup>5</sup> <http://www.timminspress.com/2018/02/13/iamgold-set-for-restart>

The following Table, *Table 1.0 Current, 2027 Workforce Forecast, Retirement and Deficit Forecast* is a high-level overview of the employment changes and the cumulative impact of retirements on workforce availability.

**Table 1.0 Current, 2027 Workforce Forecast, Retirement and Deficit Forecast**

	Current Workforce 2017	Required Workforce 2027	Net Change 2017 to 2027	Cumulative Retirements 2017-2027	Workforce (Deficit) Surplus 2027
Total Mining and Mine Supplier Positions	6,461	7,348	887	1,932	(2,819)

Table 1.0 indicates:

- A 14% expansion in workforce requirements<sup>6</sup> and a workforce retirement forecast of 30% within the next 10 years<sup>7</sup>. The combined workforce shortfall is therefore 44%<sup>8</sup>.

Stated another way, by 2027 approximately 44% of positions in this region will require a replacement worker.

The following Table, *Table 1.1 Out of Region Workforce Summary* indicates that approximately 14%<sup>9</sup> of mining related positions within the region are held by 'out of region workers'.

**Table 1.1 Out of Region Workforce Summary**

	Current Workforce 2017	Out of Region Workforce	
	#	#	%
Total Mining and Mine Supplier Positions	6,461	925	14.0

<sup>6</sup> Current workforce of 6,461 employees divided by future workforce 7,348 employees = 13.7% expansion

<sup>7</sup> Cumulative retirements of 1,932 employees divided by 6,461 current employees = 30% retirement rate

<sup>8</sup> Workforce deficit of 2,819 employees divided by current workforce of 6,461 = 44% shortfall

<sup>9</sup> Out of region workforce of 925 employees divided by current workforce of 6,461 = 14%

Occupations of Interest are occupations that are in high demand, are industry specific, or have a high level of impact on the industry. The Industry Working Group identified the Occupations of Interest indicated in *Table 1.2: Occupations of Interest Summary*.

**Table 1.2: Occupations of Interest Summary**

Occupations of Interest	
1.1	Underground production and development miners
1.3	Construction millwrights and industrial mechanics (except textile)
1.4	Heavy equipment operators (except crane)
1.5	Industrial electricians
1.8	Central control and process operators, mineral and metal processing
1.9	Heavy-duty equipment mechanics
1.10	Truck drivers
1.12	Welders and related machine operators
1.16	Drillers and blasters – Surface mining, quarrying and construction
2.1	Geologists, geochemist and geophysicists
2.4	Metallurgical and material engineers
2.7	Chemists
4.12	Asset Protection
6.1	Supervisors, mineral and metal processing
6.2	Supervisors, mining and quarrying
6.4	Contractors and supervisors, mechanic trades

## 2.0 INTRODUCTION AND PROJECT OVERVIEW

Primary resource extraction activities such as forestry, aggregate production, and mining and mining supply services comprise a significant portion of Northeastern Ontario's economy.

The Far Northeast Training Board region (see section 2.3 *Project Sponsor*) is host to nine active mining operations, dozens of advanced exploration projects with nine of them at the advanced stage, and approximately 150 mine supply service companies. This report attempts to estimate the workforce requirements for the mining and mining supply industries for the period of 2017-2027.

### 2.1 LOCAL MINING ACTIVITY

The region has been an active mining camp for over 100 years and continues to produce a wide variety of base metals, precious metals, gemstones, and industrial minerals. A number of currently producing regional mines have publicly announced closure:

- De Beers Victor diamond mine, scheduled for closure in 2019<sup>10</sup>
- Kidd Creek base metal mine, scheduled for closure in 2023<sup>11</sup>

A number of currently producing and advanced exploration sites have publicly announced expansion or startup activities:

- Goldcorp Century Project<sup>12</sup>
- Goldcorp Borden Lake Project<sup>13</sup>
- Iamgold Côté Project<sup>14</sup>

These closure or expansion activities are intended to illustrate that the region undergoes a continual shift in workforce requirements. These examples are not intended to be a full listing of mining events within the region.

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<sup>10</sup> <http://www.cbc.ca/news/canada/sudbury/debeers-victor-closure-2019-1.4382977>

<sup>11</sup> <http://www.timminspress.com/2016/11/16/kidd-doesnt-foresee-extension-of-mine-beyond-2022>

<sup>12</sup> <https://www.goldcorp.com/portfolio/development-projects/century/default.aspx>

<sup>13</sup> <https://www.goldcorp.com/English/portfolio/development-projects/borden/default.aspx>

<sup>14</sup> <http://www.timminspress.com/2018/02/13/iamgold-set-for-restart>



## 2.2 PROJECT GOALS

The goals of this project include:

- The identification of the total change in workforce requirement due to closures, expansions, and start-ups.
- The identification of the impact of workforce retirements.
- A projection of occupation specific workforce requirements, the impact of retirements on those occupations, and a quantification of the 'out of region workforce'.
- An identification of Occupations of Interest and the development of occupational profiles for the Occupations of Interest.
- Stimulating industry and educators to develop actions that will ensure a readily available workforce.

## 2.3 PROJECT SPONSOR

The FNETB is a regional not-for-profit organization that is responsible for labour market information, integrated planning, service coordination for employers, and research and innovation. The mission of the FNETB is to “promote the effective planning of training and workforce development programs and services so that qualified workers are available to meet the needs of the local labour market”. The FNETB provides these core services within Northeastern Ontario and is part of a provincial network of 26 local employment planning councils (LEPC) and workforce planning boards (WPB).





## 2.4 PROJECT METHODOLOGY

The FNETB issued a request for proposals in August 2017. Clearlogic Consulting Professionals was retained to provide this service and are the authors of this report.

An Industry Working Group (IWG) was established and was comprised of human resource managers of active mine sites, representatives from mining suppliers, and training and education organizations. The role of the IWG was to provide input into the data collection tool and process, and to assist in identifying ‘occupations of interest’.

## 2.5 RESEARCH METHODOLOGY

The consulting team developed a draft data collection tool for review and input by the IWG. The data collection focused on two key areas; total workforce (headcount) required, and anticipated retirements (headcount). Both projections were collected in two-year increments, ending in 2027.

The purpose of gathering total workforce headcount and retirement headcount is to identify the future replacement workforce that is required. By comparing future workforce requirements and subtracting anticipated workforce retirements, we can identify potential shortages (occupations of interest) and implement strategies to ensure a readily available and skilled workforce.

The IWG also identified an additional data point to gather, that being the quantification of the ‘out of region’ workforce. Out of region workers work in the region but have a primary residence outside of the region. Remote workforces are relatively common in industrial and camp settings that have extended on-site/off-site rotation schedules. The rationale for collecting this data point is to quantify the opportunity to further develop and make available a local workforce with the aim to attempt to repatriate those occupations.

## 2.6 DATA COLLECTION

Primary data collection took place with three specific audiences; active mines, advanced exploration projects, and mining suppliers. All audiences were advised to consider only employees that work within the FNETB region, as depicted by the map in Section 2.3 *Project Sponsor*.

Human resource managers from the active mine sites and advanced exploration sites were provided with a one-on-one orientation prior to survey completion. Human resource managers completed the surveys and the surveys were generally returned within a two-week period.

Mining supply companies were provided the same orientation. Many of the smaller supply companies chose to provide employment data during the orientation phone conversation and this was recorded at that time.

### **2.6.1 SURVEY CONFIDENTIALITY**

This report contains aggregate data only and does not include individual company data. Survey respondents participated based upon this assurance of confidentiality, and this ultimately resulted in high participation rates. High participation rates were also aided by the close working relationship that the FNETB has with the mining industry.

### **2.6.2 PARTICIPATION SUMMARY**

The following participation rates were realized:

- Active mines: 9 of 9 mines provided workforce data (100% participation rate)
- Advanced exploration sites: 2 of 9 provided workforce data (22% participation rate)
- Mining suppliers: 52 of 150 provided workforce data (35% participation rate)

### **2.6.3 MINE SITE PARTICIPATION**

Active mine site participation included two mines that are sunsetting towards closure, several that are in stable production environments, and several that are engaged in expansion activities.

### **2.6.4 ADVANCED EXPLORATION SITE PARTICIPATION**

Advanced exploration participation rates were influenced by the following:

- Projects may be too premature and/or the timeline too far out to warrant workforce projections
- The project owners were uncomfortable in disclosing this information
- The project was resource constrained and was unable to allocate human resource efforts towards workforce planning

## **2.6.5 MINING SUPPLIER PARTICIPATION**

The IWG, Chambers of Commerce within the region, and active mine sites assisted the study authors in developing a mining supplier list. The mine supplier list contained approximately 150 potential survey respondents and included but not limited to: exploration services, mine development contractors, fabrication and repair shops, heavy equipment suppliers, parts and materials suppliers, and professional and technical service providers. The mine supplier list developed for this project compares favorably to the Ontario Golden North Mining Supply and Services Analysis project<sup>15</sup> that identified 115 mining suppliers in Northeastern Ontario.

## **2.6.6 MINING SUPPLIER DATA ADJUSTMENT**

The mining supply sector varies from closely aligned to the mining industry to slightly aligned. Workforce estimates within this report have been adjusted to reflect full time mining related employment positions. For example, if a supplier has two welders and 50% of their work is mining related, one welder was included within the data collection.

## **2.7 DATA LIMITATIONS AND CAUTION TO READER**

Survey respondents self-completed the workforce estimates and based their data upon planned mining and mining related activities. A number of conditions may positively or negatively affect these forecasts and include:

- Occupations as identified on the survey may not directly map over to the respondent's job classification system. This may result in incomplete or incorrect estimates.
- Economic conditions that may affect global metal prices or contractual obligations.
- Changes in input costs (labour, fuel, equipment, utilities) that may affect profitability and sustainability.
- Changes in mining conditions, ore quality, and/or reserves (proven and probable).
- Technological considerations such as automation, remote operation, and operator less equipment and processes.
- Unforeseen events including changes to the political or regulatory environments.
- Business plans that attempt to expand a workforce. For example, a mine supplier may forecast increased staffing and business activity that may come at the expense of an existing mine supplier.
- Actual retirement numbers and timing may not materialize as forecasted.

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<sup>15</sup> Commissioned by the Timmins Economic Development Corporation in 2017

### 2.7.1 ZERO COUNTS

Readers are also cautioned that mine ore reserves are often defined for the near-term only. In addition to the two mines that are intending closure, two other mines have reported a zero workforce partway throughout the ten-year forecast. For example, one mine reports approximately 300 employees in 2019, and then 0 in 2021. Another mine reports 1200 employees in 2021 and then 0 in 2023. Both mines are not intending closure but have not yet developed business plans or labour forecasts beyond the timeframes as stated. Both of these mines are highly likely to continue production into 2027.

Please note that the workforce forecast within this report assumes that these two mine sites will continue into 2027. This report uses the last known occupational forecasts provided by the two mines and continues these numbers into 2027.



### 3.0 KEY FINDINGS

This section provides a summary analysis and includes the impact of workforce contraction, the impact of workforce expansion, and the impact of retirements. This section also provides information on the 'out of region workforce'.

#### 3.1 WORKFORCE FORECAST SUMMARY

The following Table, *Table 3.1.0: Current, Biennial Workforce Forecast, and Biennial Retirement Forecast* is a high-level overview of the predicted employment change and predicted retirements.

**Table 3.1.0 Current, Biennial Workforce Forecast, and Biennial Retirement Forecast**

	Current Workforce 2017	Estimated Workforce 2019	Estimated Workforce 2021	Estimated Workforce 2023	Estimated Workforce 2025	Estimated Workforce 2027
Total Mining and Mine Supplier Positions	6,461	7,137	7,471	6,922	7,118	7,348
Total Mining and Mines Supplier Retirements		494	412	495	235	296

The following Table, *Table 3.1.1 Current, 2027 Workforce Forecast, Retirement and Deficit Forecast* is a high-level overview of the cumulative impact of retirements on workforce availability.

**Table 3.1.1 Current, 2027 Workforce Forecast, Retirement and Deficit Forecast**

	Current Workforce 2017	Required Workforce 2027	Net Change 2017 to 2027	Cumulative Retirements 2017-2027	Workforce (Deficit) Surplus 2027
Total Mining and Mine Supplier Positions	6,461	7,348	887	1,932	(2,819)

Tables 3.1.0 and 3.1.1 indicate:

- A 14% expansion in workforce requirements<sup>16</sup>.
- A retirement forecast of 30% of the workforce within the next 10 years<sup>17</sup>.
- A workforce expansion (+14%) and retirement impact (+30%) that results in a combined workforce shortfall of approximately 44%<sup>18</sup>.
- Stated another way, by 2027, 44 % of positions will require a replacement worker.

Refer to *Appendix 1: Occupational Projections*, and *Appendix 2: Growth and Retirement Impact Summaries* for occupational specific detail.

### 3.2 OUT OF REGION WORKERS

An out of region worker is characterized as a person who works within the FNETB region but has a permanent residence outside of the region. Many mine sites are remote, have full accommodation and workforce transportation services (bus or charter aircraft), and have work schedules that are typically 1 week in/1 week out, or '2 in/2 out'. To a lesser degree, even the more accessible (urban based) mine sites support or have been required to support out of region workers.

The following Table, *Table 3.2.1 Out of Region Workforce Summary* indicates that 14%<sup>19</sup> of workers live outside of the FNETB region.

**Table 3.2.1 Out of Region Workforce Summary**

	Current Workforce 2017	Out of Region Workforce	
	#	#	%
Total Mining and Mine Supplier Positions	6,461	925	14.0

<sup>16</sup> Current workforce of 6,461 employees divided by future workforce 7,348 employees = 13.7% expansion

<sup>17</sup> Cumulative retirements of 1,932 employees divided by 6,461 current employees = 30% retirement rate

<sup>18</sup> Workforce deficit of 2,819 employees divided by current workforce of 6,461 = 44% shortfall

<sup>19</sup> Out of region workforce of 925 employees divided by current workforce of 6,461 = 14%

The following Table, *Table 3.2.2 Out of Region Occupational Highlights* summarizes the mining and supplier related occupations that have a high degree of out of region workers, either as a percentage or as an absolute number.

**Table 3.2.2 Out of Region Occupational Highlights**

		Current Workforce 2017	Out of Region Workforce	
		#	#	%
<b>1.0</b>	<b>TRADES AND PRODUCTION OCCUPATIONS</b>			
1.1	Underground production and development miners	1,358	215	16.0
1.4	Heavy equipment operators (except crane)	357	61	17.0
1.9	Heavy-duty equipment mechanics	359	47	13.0
1.10	Truck drivers	498	126	25.0
1.12	Welders and related machine operators	250	45	18.0
1.16	Drillers and blasters – surface mining, quarrying and construction	273	57	21.0
<b>2.0</b>	<b>PROFESSIONAL AND PHYSICAL SCIENCE OCCUPATIONS</b>			
2.1	Geologist, geochemists and geophysicists	105	27	26.0
2.2	Mining engineers	83	21	25.0
2.4	Metallurgical and materials engineers	18	7	39.0
<b>4.0</b>	<b>SUPPORT WORKERS</b>			
4.12	Asset Protection	91	39	43.0
<b>5.0</b>	<b>TECHNICAL OCCUPATIONS</b>			
5.1	Geological and mineral technologists and technicians	136	16	12.0
<b>6.0</b>	<b>SUPERVISORS, COORDINATORS, FOREMEN</b>			
6.2	Supervisors, mining and quarrying	212	43	20.0





### 3.3 OCCUPATIONS OF INTEREST

Occupations of Interest are occupations that are in high demand, are mining industry specific, or have a high level of impact on the mining industry. The IWG identified the Occupations of Interest found in *Table 3.3.1: Mining Occupations of Interest Summary*. It should be noted that the projections in Table 3.3.1 and Table 3.3.2, and the full listing as found in *Appendix 1: Occupational Projections* are based upon the caution as noted in 2.7.1 Zero Counts.

**Table 3.3.1: Mining Occupations of Interest Summary**

	Current Workforce 2017	Required Workforce 2027	Net Change 2017 to 2027	Cumulative Retirements 2017-2027	Workforce (Deficit) Surplus 2027
<b>1.0 TRADES AND PRODUCTION OCCUPATIONS</b>					
1.1 Underground production and development miners	1,358	1,486	128	269	(397)
1.3 Construction millwrights and industrial mechanics (except textile)	374	727	353	86	(439)
1.4 Heavy equipment operators (except crane)	357	376	19	193	(212)
1.5 Industrial electricians	169	209	40	58	(98)
1.8 Central control and process operators, mineral and metal processing	133	129	(4)	25	(21)
1.9 Heavy-duty equipment mechanics	359	459	100	129	(229)
1.10 Truck drivers	498	655	157	179	(336)
1.12 Welders and related machine operators	250	290	40	97	(137)
1.16 Drillers and blasters – surface mining, quarrying and construction	273	305	32	66	(98)
<b>2.0 PROFESSIONAL AND PHYSICAL SCIENCE OCCUPATIONS</b>					
2.1 Geologist, geochemists and geophysicists	105	132	27	27	(54)
2.4 Metallurgical and materials engineers	18	15	(3)	4	(1)
2.7 Chemists	5	18	13	1	(14)
<b>4.0 SUPPORT WORKERS</b>					
4.12 Asset Protection	91	220	129	0	(129)
<b>6.0 SUPERVISORS, COORDINATORS, FOREMEN</b>					
6.1 Supervisors, mineral and metal processing	80	56	(24)	34	(10)
6.2 Supervisors, mining and quarrying	212	226	14	88	(102)
6.4 Contractors and supervisors, mechanic trades	93	86	(7)	19	(12)

The following Table, *Table 3.3.2: Mining Occupations of Interest-Biennial Projections*, provides a more detailed breakdown of the Occupations of Interest.

**Table 3.3.2: Mining Occupations of Interest-Biennial Projections**

		Current Workforce 2017	Estimated Workforce				
			2019	2021	2023	2025	2027
1.0	TRADES AND PRODUCTION OCCUPATIONS						
1.1	Underground production and development miners	1,358	1,513	1,631	1,505	1,465	1,486
	Retirements		67	51	89	26	36
1.3	Construction millwrights and industrial mechanics (except textile)	374	449	484	461	662	727
	Retirements		35	16	13	16	6
1.4	Heavy equipment operators (except crane)	357	405	403	386	379	376
	Retirements		50	42	46	25	30
1.5	Industrial electricians	169	221	221	206	206	209
	Retirements		20	15	13	5	5
1.8	Central control and process operators, mineral and metal processing	133	132	132	128	128	129
	Retirements		5	6	6	4	4
1.9	Heavy-duty equipment mechanics	359	427	442	418	435	459
	Retirements		35	32	30	13	19
1.10	Truck drivers	498	491	588	584	586	655
	Retirements		47	30	29	33	40
1.12	Welders and related machine operators	250	279	285	274	282	290
	Retirements		24	18	24	15	16
1.16	Drillers and blasters – surface mining, quarrying and construction	273	282	319	287	288	305
	Retirements		13	17	21	7	8
2.0	PROFESSIONAL AND PHYSICAL SCIENCE OCCUPATIONS						
2.1	Geologist, geochemists and geophysicists	105	128	130	130	131	132
	Retirements		5	4	8	3	7

		Current Workforce 2017	Estimated Workforce				
			2019	2021	2023	2025	2027
2.4	Metallurgical and materials engineers	18	20	20	15	15	15
	Retirements		1	0	2	0	1
2.7	Chemists	5	19	18	18	18	18
	Retirements		0	0	1	0	0
4.0 SUPPORT WORKERS							
4.12	Asset Protection	91	142	160	180	200	220
	Retirements		0	0	0	0	0
6.0 SUPERVISORS, COORDINATORS, FOREMEN							
6.1	Supervisors, mineral and metal processing	80	75	77	63	65	56
	Retirements		8	7	12	4	3
6.2	Supervisors, mining and quarrying	212	244	249	217	222	226
	Retirements		18	18	21	15	16
6.4	Contractors and supervisors, mechanic trades	93	89	85	85	85	86
	Retirements		5	4	3	4	3



## 4.0 NEXT STEPS

The regional mining industry is undergoing a period of significant workforce adjustment. The growth forecast, although modest (14% projected net growth, from 2017-2027), when combined with the high retirement rate (30% projected retirement from 2017-2027) will put significant pressure on workforce availability.

It will take the collective efforts of industry, educational institutions, government agencies, and communities to support the mining workforce adjustment that will occur within the next ten years, and to identify and develop strategies to train, attract and retain a skilled workforce. To that effect, the following is recommended:

- Package and communicate the results of this report for different audiences: educators, students, parents, industry, employment services, community and government agencies, etc.
- Promote the results of this report, and careers in mining at the 2018 Canadian Mining Expo.
- Establish a working group to investigate options and opportunities related to training, attraction and retention strategies such as:
  - Communication between employer needs and education institutions to ensure that local education and training is aligned with those needs.
  - Experiential learning opportunities to encourage graduates to return or stay in the region.
  - Awareness and promotional activities in order to expand workforce availability and participation, including women, Indigenous, and youth.
  - Targeted initiatives to re-attract and retain retirees and mature workers to mentor younger workers and facilitate knowledge transfer and succession planning.
  - Initiatives to ensure the smooth transition of workers affected by mine closures towards other mining companies or other industries.
  - Attraction and recruitment campaigns in locations and industries that have high provincial or national unemployment rates and have similar industrial occupations.

## APPENDIX 1 OCCUPATIONAL PROJECTIONS

Adjusted for zero counts as noted in Section 2.7.1

		Current Workforce 2017	Estimated Workforce				
			2019	2021	2023	2025	2027
1.0	TRADES AND PRODUCTION OCCUPATIONS						
1.1	Underground production and development miners	1,358	1,513	1,631	1,505	1,465	1,486
	Retirements		67	51	89	26	36
1.2	Labourers in mineral and metal processing	94	126	125	113	113	113
	Retirements		7	6	11	4	8
1.3	Construction millwrights and industrial mechanics (except textile)	374	449	484	461	662	727
	Retirements		35	16	13	16	6
1.4	Heavy equipment operators (except crane)	357	405	403	386	379	376
	Retirements		50	42	46	25	30
1.5	Industrial electricians	169	221	221	206	206	209
	Retirements		20	15	13	5	5
1.6	Crane operators	12	13	21	21	21	21
	Retirements		1	0	1	1	1
1.7	Machine operators, mineral and metal processing	180	173	178	127	128	129
	Retirements		20	22	26	5	16
1.8	Central control and process operators, mineral and metal processing	133	132	132	128	128	129
	Retirements		5	6	6	4	4
1.9	Heavy-duty equipment mechanics	359	427	442	418	435	459
	Retirements		35	32	30	13	19
1.10	Truck drivers	498	491	588	584	586	655
	Retirements		47	30	29	33	40
1.11	Material handlers	100	103	107	103	104	107
	Retirements		7	7	10	1	3
1.12	Welders and related machine operators	250	279	285	274	282	290
	Retirements		24	18	24	15	16

	Current Workforce 2017	Estimated Workforce				
		2019	2021	2023	2025	2027
1.13 Underground mine service and support workers	167	183	181	132	132	132
Retirements		26	29	33	0	1
1.14 Construction trades helpers and labourers	107	6	6	6	6	6
Retirements		3	4	3	2	2
1.15 Steamfitters, pipefitters and sprinkler system installers	26	16	15	2	2	2
Retirements		0	0	0	0	1
1.16 Drillers and blasters – surface mining, quarrying and construction	273	282	319	287	288	305
Retirements		13	17	21	7	8
1.17 Carpenters	14	26	19	19	19	19
Retirements		4	3	2	2	1
1.18 Plumbers	5	6	6	6	6	6
Retirements		0	0	1	1	0
1.19 Other trades helpers and labourers	89	123	125	121	121	123
Retirements		6	5	8	5	8
1.20 Hoist operators	12	15	15	15	14	14
Retirements		2	0	0	0	0
<b>TRADES AND PRODUCTION TOTAL POSITIONS</b>	<b>4,577</b>	<b>4,989</b>	<b>5,303</b>	<b>4,914</b>	<b>5,097</b>	<b>5,308</b>
<b>TRADES AND PRODUCTION TOTAL RETIREMENTS</b>		<b>372</b>	<b>303</b>	<b>366</b>	<b>165</b>	<b>205</b>
<b>2.0 PROFESSIONAL AND PHYSICAL SCIENCE OCCUPATIONS</b>						
2.1 Geologist, geochemists and geophysicists	105	128	130	130	131	132
Retirements		5	4	8	3	7
2.2 Mining engineers	83	95	102	88	88	88
Retirements		4	4	4	2	1
2.3 Industrial and manufacturing engineers	3	3	3	3	3	3
Retirements		0	0	1	0	0
2.4 Metallurgical and materials engineers	18	20	20	15	15	15
Retirements		1	0	2	0	1
2.5 Mechanical engineers	12	15	14	14	14	14
Retirements		2	1	0	0	1

		Current Workforce 2017	Estimated Workforce				
			2019	2021	2023	2025	2027
2.6	Other professional occupations in physical sciences	8	6	4	0	0	0
	Retirements		0	0	0	0	0
2.7	Chemists	5	19	18	18	18	18
	Retirements		0	0	1	0	0
2.8	Electrical and electronics engineers	9	14	14	13	13	13
	Retirements		2	1	2	0	1
2.9	Chemical engineers	1	1	1	1	1	0
	Retirements		0	0	0	0	0
2.10	Civil engineers	3	3	3	2	2	2
	Retirements		0	1	1	0	0
2.11	Geological engineers	7	11	10	9	9	9
	Retirements		0	1	0	0	1
2.12	Other professional engineers	13	11	12	8	8	8
	Retirements		0	0	0	0	0
2.13	Biologists and related scientists	2	3	3	3	3	3
	Retirements		0	0	0	0	0
PROFESSIONAL AND PHYSICAL SCIENCE TOTAL POSITIONS		269	329	334	304	305	305
PROFESSIONAL AND PHYSICAL SCIENCE TOTAL RETIREMENTS			14	12	19	5	12
3.0 HUMAN RESOURCES AND FINANCIAL OCCUPATIONS							
3.1	Financial auditors and accountants	42	55	56	50	49	49
	Retirements		2	3	2	2	1
3.2	Human resources managers	9	10	10	9	9	9
	Retirements		1	1	0	0	1
3.3	Financial and procurement managers	27	31	31	30	30	30
	Retirements		1	0	1	3	5
3.4	Specialists in human resources	82	99	85	72	70	71
	Retirements		6	7	8	3	6
3.5	Financial and investments analysts	3	6	6	6	6	6
	Retirements		0	0	0	0	1



		Current Workforce 2017	Estimated Workforce				
			2019	2021	2023	2025	2027
3.6	Sales and marketing	30	33	34	34	34	34
	Retirements		0	1	1	1	3
HUMAN RESOURCES AND FINANCIAL TOTAL POSITIONS		193	234	222	201	198	199
HUMAN RESOURCES AND FINANCIAL TOTAL RETIREMENTS			10	12	12	9	17
4.0 SUPPORT WORKERS							
4.1	Inspectors and testers, mineral and metal processing	48	47	39	38	38	38
	Retirements		0	0	1	2	1
4.2	Production clerks	38	31	26	25	25	25
	Retirements		1	0	0	2	0
4.3	Secretaries (except legal and medical)	7	7	7	7	7	7
	Retirements		0	0	1	1	1
4.4	Dispatchers and radio operators	11	12	14	14	14	14
	Retirements		0	1	1	1	1
4.5	Inspectors in public and environmental health	10	13	13	8	8	8
	Retirements		1	1	1	0	2
4.6	Inspectors in occupational health and safety	31	35	35	21	21	21
	Retirements		5	5	5	0	4
4.7	Administrative clerks	178	183	182	170	170	171
	Retirements		5	9	8	4	8
4.8	Transportation route and crew schedulers	1	3	2	2	2	2
	Retirements		0	0	0	0	0
4.9	Construction estimators	12	12	12	12	12	12
	Retirements		1	0	2	0	0
4.10	Engineering inspectors and regulatory officers	1	1	0	0	0	0
	Retirements		0	0	0	0	0
4.11	Kitchen and janitorial	4	42	41	41	41	41
	Retirements		0	0	0	0	0
4.12	Asset Protection	91	142	160	180	200	220
	Retirements		0	0	0	0	0

		Current Workforce 2017	Estimated Workforce				
			2019	2021	2023	2025	2027
SUPPORT WORKERS TOTAL POSITIONS		432	528	531	518	538	558
SUPPORT WORKERS TOTAL RETIREMENTS			13	16	19	10	17
5.0	TECHNICAL OCCUPATIONS						
5.1	Geological and mineral technologists and technicians	136	142	147	125	115	115
	Retirements		14	12	12	2	2
5.2	Chemical technologists and technicians	38	46	52	49	49	49
	Retirements		2	1	1	0	1
5.3	Industrial engineering and manufacturing technologists and technicians	10	6	6	6	6	6
	Retirements		0	0	0	1	0
5.4	Electrical and electronics engineering technologists and technicians	22	23	23	21	21	21
	Retirements		2	0	0	0	0
5.5	Mechanical engineering technologists and technicians	18	17	17	16	16	16
	Retirements		2	1	1	1	1
5.6	Drafting technologists and technicians	19	19	21	21	21	21
	Retirements		0	1	1	1	2
5.7	Land surveyors	27	28	28	26	25	25
	Retirements		1	3	3	1	0
5.8	Mapping and related technologists and technicians	11	9	9	9	9	9
	Retirements		0	0	0	1	0
5.9	Land survey technologists and technicians	18	18	15	15	15	15
	Retirements		1	3	3	1	0
5.10	Civil engineering technologists and technicians	6	6	7	7	7	7
	Retirements		1	0	0	0	0
5.11	Biological technologists and technicians	24	26	21	19	17	17
	Retirements		0	0	0	0	0
5.12	Other technical positions	35	44	58	61	61	61
	Retirements		0	0	0	0	0
	TECHNICAL POSITIONS TOTAL POSITIONS	364	384	404	375	362	362
	TECHNICAL POSITIONS TOTAL RETIREMENTS		23	21	21	8	6

		Current Workforce 2017	Estimated Workforce				
			2019	2021	2023	2025	2027
6.0	SUPERVISORS, COORDINATORS, FOREMEN						
6.1	Supervisors, mineral and metal processing	80	75	77	63	65	56
	Retirements		8	7	12	4	3
6.2	Supervisors, mining and quarrying	212	244	249	217	222	226
	Retirements		18	18	21	15	16
6.3	Primary production managers (except agriculture)	45	50	50	49	49	49
	Retirements		0	3	4	3	1
6.4	Contractors and supervisors, mechanic trades	93	89	85	85	85	86
	Retirements		5	4	3	4	3
6.5	Engineering managers	12	11	11	10	10	10
	Retirements		0	0	0	1	0
6.6	Construction managers	5	7	5	5	5	5
	Retirements		0	0	0	1	0
6.7	Contractors and supervisors, pipefitting trades	15	15	13	15	15	15
	Retirements		0	0	3	2	2
6.8	Other supervisors and managers	164	182	187	166	167	169
	Retirements		31	16	15	8	14
SUPERVISORS, COORDINATORS TOTAL POSITIONS		626	673	677	610	618	616
SUPERVISORS, COORDINATORS TOTAL RETIREMENTS			62	48	58	38	39

## APPENDIX 2

### GROWTH AND RETIREMENT IMPACTS SUMMARIES

Adjusted for zero counts as noted in Section 2.7.1

		Current Workforce 2017	Required Workforce 2027	Net Change 2017- 2027	Cumulative Retirements 2017-2027	Workforce (Deficit) Surplus 2027	Out of Region Workforce
<b>1.0 TRADES AND PRODUCTION OCCUPATIONS</b>							
1.1	Underground production and development miners	1,358	1,486	128	269	(397)	215
1.2	Labourers in mineral and metal processing	94	113	19	36	(55)	7
1.3	Construction millwrights and industrial mechanics (except textile)	374	727	353	86	(439)	27
1.4	Heavy equipment operators (except crane)	357	376	19	193	(212)	61
1.5	Industrial electricians	169	209	40	58	(98)	17
1.6	Crane operators	12	21	9	4	(13)	4
1.7	Machine operators, mineral and metal processing	180	129	(51)	89	(38)	17
1.8	Central control and process operators, mineral and metal processing	133	129	(4)	25	(21)	6
1.9	Heavy-duty equipment mechanics	359	459	100	129	(229)	47
1.10	Truck drivers	498	655	157	179	(336)	126
1.11	Material handlers	100	107	7	28	(35)	5
1.12	Welders and related machine operators	250	290	40	97	(137)	45
1.13	Underground mine service and support workers	167	132	(35)	89	(54)	7
1.14	Construction trades helpers and labourers	107	6	(101)	14	87	2
1.15	Steamfitters, pipefitters and sprinkler system installers	26	2	(24)	1	23	1
1.16	Drillers and blasters – surface mining, quarrying and construction	273	305	32	66	(98)	57
1.17	Carpenters	14	19	5	12	(17)	0
1.18	Plumbers	5	6	1	2	(3)	0
1.19	Other trades helpers and labourers	89	123	34	32	(66)	10
1.20	Hoist operators	12	14	2	2	(4)	5
<b>TRADES AND PRODUCTION TOTAL POSITIONS</b>		<b>4,577</b>	<b>5,308</b>	<b>731</b>	<b>1,411</b>	<b>(2,142)</b>	<b>658</b>

	Current Workforce 2017	Required Workforce 2027	Net Change 2017- 2027	Cumulative Retirements 2017-2027	Workforce (Deficit) Surplus 2027	Out of Region Workforce
<b>2.0 PROFESSIONAL AND PHYSICAL SCIENCE OCCUPATIONS</b>						
2.1 Geologist, geochemists and geophysicists	105	132	27	27	(54)	27
2.2 Mining engineers	83	88	5	15	(20)	21
2.3 Industrial and manufacturing engineers	3	3	0	1	(1)	0
2.4 Metallurgical and materials engineers	18	15	(3)	4	(1)	7
2.5 Mechanical engineers	12	14	2	4	(6)	3
2.6 Other professional occupations in physical sciences	8	0	(8)	0	8	2
2.7 Chemists	5	18	13	1	(14)	1
2.8 Electrical and electronics engineers	9	13	4	6	(10)	0
2.9 Chemical engineers	1	0	(1)	0	1	0
2.10 Civil engineers	3	2	(1)	2	(1)	0
2.11 Geological engineers	7	9	2	2	(4)	5
2.12 Other professional engineers	13	8	(5)	0	5	2
2.13 Biologists and related scientists	2	3	1	0	(1)	0
<b>PROFESSIONAL AND PHYSICAL SCIENCE TOTAL POSITIONS</b>	<b>269</b>	<b>305</b>	<b>36</b>	<b>62</b>	<b>(98)</b>	<b>68</b>
<b>3.0 HUMAN RESOURCES AND FINANCIAL OCCUPATIONS</b>						
3.1 Financial auditors and accountants	42	49	7	10	(17)	3
3.2 Human resources managers	9	9	0	3	(3)	0
3.3 Financial and procurement managers	27	30	3	10	(13)	0
3.4 Specialists in human resources	82	71	(11)	30	(19)	11
3.5 Financial and investments analysts	3	6	3	1	(4)	0
3.6 Sales and marketing	30	34	4	6	(10)	0
<b>HUMAN RESOURCES AND FINANCIAL TOTAL POSITIONS</b>	<b>193</b>	<b>199</b>	<b>6</b>	<b>60</b>	<b>(66)</b>	<b>14</b>
<b>4.0 SUPPORT WORKERS</b>						
4.1 Inspectors and testers, mineral and metal processing	48	38	(10)	4	6	3
4.2 Production clerks	38	25	(13)	3	10	2
4.3 Secretaries (except legal and medical)	7	7	0	3	(3)	0
4.4 Dispatchers and radio operators	11	14	3	4	(7)	0

		Current Workforce 2017	Required Workforce 2027	Net Change 2017- 2027	Cumulative Retirements 2017-2027	Workforce (Deficit) Surplus 2027	Out of Region Workforce
4.5	Inspectors in public and environmental health	10	8	(2)	5	(3)	0
4.6	Inspectors in occupational health and safety	31	21	(10)	19	(9)	1
4.7	Administrative clerks	178	170	(8)	34	(26)	26
4.8	Transportation route and crew schedulers	1	2	1	0	(1)	0
4.9	Construction estimators	12	12	0	3	(3)	1
4.10	Engineering inspectors and regulatory officers	1	0	(1)	0	1	1
4.11	Kitchen and janitorial	4	41	37	0	(37)	0
4.12	Asset Protection	91	220	129	0	(129)	39
<b>SUPPORT WORKERS TOTAL POSITIONS</b>		<b>432</b>	<b>558</b>	<b>126</b>	<b>75</b>	<b>(201)</b>	<b>73</b>
<b>5.0</b>	<b>TECHNICAL OCCUPATIONS</b>						
5.1	Geological and mineral technologists and technicians	136	115	(21)	42	(21)	16
5.2	Chemical technologists and technicians	38	49	11	5	(16)	0
5.3	Industrial engineering and manufacturing technologists and technicians	10	6	(4)	1	3	1
5.4	Electrical and electronics engineering technologists and technicians	22	21	(1)	2	(1)	1
5.5	Mechanical engineering technologists and technicians	18	16	(2)	6	(4)	4
5.6	Drafting technologists and technicians	19	21	2	5	(7)	1
5.7	Land surveyors	27	25	(2)	8	(6)	1
5.8	Mapping and related technologists and technicians	11	9	(2)	1	1	0
5.9	Land survey technologists and technicians	18	15	(3)	8	(5)	2
5.10	Civil engineering technologists and technicians	6	7	1	1	(2)	0
5.11	Biological technologists and technicians	24	17	(7)	0	7	4
5.12	Other technical positions	35	61	26	0	(26)	0
	<b>TECHNICAL POSITIONS TOTAL POSITIONS</b>	<b>364</b>	<b>362</b>	<b>(2)</b>	<b>79</b>	<b>(77)</b>	<b>30</b>
<b>6.0</b>	<b>SUPERVISORS, COORDINATORS, FOREMEN</b>						
6.1	Supervisors, mineral and metal processing	80	56	924)	34	(10)	5
6.2	Supervisors, mining and quarrying	212	226	14	88	(102)	43
6.3	Primary production managers (except agriculture)	45	49	4	11	(15)	5
6.4	Contractors and supervisors, mechanic trades	93	86	(7)	19	(12)	10

	Current Workforce 2017	Required Workforce 2027	Net Change 2017- 2027	Cumulative Retirements 2017-2027	Workforce (Deficit) Surplus 2027	Out of Region Workforce
6.5 Engineering managers	12	10	(2)	1	1	0
6.6 Construction managers	5	5	0	1	(1)	2
6.7 Contractors and supervisors, pipefitting trades	15	15	0	7	(7)	0
6.8 Other supervisors and managers	164	169	5	84	(89)	17
<b>SUPERVISORS, COORDINATORS TOTAL POSITIONS</b>	<b>626</b>	<b>616</b>	<b>(10)</b>	<b>245</b>	<b>(235)</b>	<b>82</b>



## APPENDIX 3

### ADJUSTED AND NON-ADJUSTED WORKFORCE FORECAST

See explanation in Section 2.7.1

			Adjusted for Zero Reports <i>(see Section 2.7.1)</i>	Not Adjusted for Zero Reports <i>(see Section 2.7.1)</i>
			Workforce (Deficit) Surplus 2027	Workforce (Deficit) Surplus 2027
	Current Workforce 2017	Cumulative Retirements 2017-2027		
<b>1.0 TRADES AND PRODUCTION OCCUPATIONS</b>				
1.1 Underground production and development miners	1,358	269	(397)	68
1.2 Labourers in mineral and metal processing	94	36	(55)	(47)
1.3 Construction millwrights and industrial mechanics (except textile)	374	86	(439)	(405)
1.4 Heavy equipment operators (except crane)	357	193	(212)	(142)
1.5 Industrial electricians	169	58	(98)	(44)
1.6 Crane operators	12	4	(13)	(13)
1.7 Machine operators, mineral and metal processing	180	89	(38)	(34)
1.8 Central control and process operators, mineral and metal processing	133	25	(21)	16
1.9 Heavy-duty equipment mechanics	359	129	(229)	(109)
1.10 Truck drivers	498	179	(336)	(261)
1.11 Material handlers	100	28	(35)	(29)
1.12 Welders and related machine operators	250	97	(137)	(117)
1.13 Underground mine service and support workers	167	89	(54)	(12)
1.14 Construction trades helpers and labourers	107	14	87	88
1.15 Steamfitters, pipefitters and sprinkler system installers	26	1	23	23
1.16 Drillers and blasters – surface mining, quarrying and construction	273	66	(98)	(79)
1.17 Carpenters	14	12	(17)	(15)
1.18 Plumbers	5	2	(3)	(1)
1.19 Other trades helpers and labourers	89	32	(66)	(6)
1.20 Hoist operators	12	2	(4)	(4)
<b>TRADES AND PRODUCTION TOTAL POSITIONS</b>	<b>4,577</b>	<b>1,411</b>	<b>(2,142)</b>	<b>(1,123)</b>

			Adjusted for Zero Reports <i>(see Section 2.7.1)</i>	Not Adjusted for Zero Reports <i>(see Section 2.7.1)</i>
			Workforce (Deficit) Surplus 2027	Workforce (Deficit) Surplus 2027
	Current Workforce 2017	Cumulative Retirements 2017-2027		
<b>2.0 PROFESSIONAL AND PHYSICAL SCIENCE OCCUPATIONS</b>				
2.1 Geologist, geochemists and geophysicists	105	27	(54)	(5)
2.2 Mining engineers	83	15	(20)	(2)
2.3 Industrial and manufacturing engineers	3	1	(1)	(1)
2.4 Metallurgical and materials engineers	18	4	(1)	8
2.5 Mechanical engineers	12	4	(6)	(15)
2.6 Other professional occupations in physical sciences	8	0	8	8
2.7 Chemists	5	1	(14)	(14)
2.8 Electrical and electronics engineers	9	6	(10)	(2)
2.9 Chemical engineers	1	0	1	1
2.10 Civil engineers	3	2	(1)	(1)
2.11 Geological engineers	7	2	(4)	(2)
2.12 Other professional engineers	13	0	5	6
2.13 Biologists and related scientists	2	0	(1)	(1)
<b>PROFESSIONAL AND PHYSICAL SCIENCE TOTAL POSITIONS</b>	<b>269</b>	<b>62</b>	<b>(98)</b>	<b>(20)</b>
<b>3.0 HUMAN RESOURCES AND FINANCIAL OCCUPATIONS</b>				
3.1 Financial auditors and accountants	42	10	(17)	(6)
3.2 Human resources managers	9	3	(3)	(1)
3.3 Financial and procurement managers	27	10	(13)	(10)
3.4 Specialists in human resources	82	30	(19)	(13)
3.5 Financial and investments analysts	3	1	(4)	(2)
3.6 Sales and marketing	30	6	(10)	(10)
<b>HUMAN RESOURCES AND FINANCIAL TOTAL POSITIONS</b>	<b>193</b>	<b>60</b>	<b>(66)</b>	<b>(42)</b>
<b>4.0 SUPPORT WORKERS</b>				
4.1 Inspectors and testers, mineral and metal processing	48	4	6	6
4.2 Production clerks	38	3	10	16
4.3 Secretaries (except legal and medical)	7	3	(3)	(3)

				Adjusted for Zero Reports <i>(see Section 2.7.1)</i>	Not Adjusted for Zero Reports <i>(see Section 2.7.1)</i>
				Workforce (Deficit) Surplus 2027	Workforce (Deficit) Surplus 2027
		Current Workforce 2017	Cumulative Retirements 2017-2027		
4.4	Dispatchers and radio operators	11	4	(7)	(3)
4.5	Inspectors in public and environmental health	10	5	(3)	(3)
4.6	Inspectors in occupational health and safety	31	19	(9)	(5)
4.7	Administrative clerks	178	34	(26)	(14)
4.8	Transportation route and crew schedulers	1	0	(1)	(1)
4.9	Construction estimators	12	3	(3)	(3)
4.10	Engineering inspectors and regulatory officers	1	0	1	1
4.11	Kitchen and janitorial	4	0	(37)	(37)
4.12	Asset Protection	91	0	(129)	(117)
SUPPORT WORKERS TOTAL POSITIONS		432	75	(201)	(163)
5.0 TECHNICAL OCCUPATIONS					
5.1	Geological and mineral technologists and technicians	136	42	(21)	6
5.2	Chemical technologists and technicians	38	5	(16)	(16)
5.3	Industrial engineering and manufacturing technologists and technicians	10	1	3	7
5.4	Electrical and electronics engineering technologists and technicians	22	2	(1)	2
5.5	Mechanical engineering technologists and technicians	18	6	(4)	(4)
5.6	Drafting technologists and technicians	19	5	(7)	(6)
5.7	Land surveyors	27	8	(6)	(4)
5.8	Mapping and related technologists and technicians	11	1	1	1
5.9	Land survey technologists and technicians	18	8	(5)	5
5.10	Civil engineering technologists and technicians	6	1	(2)	(2)
5.11	Biological technologists and technicians	24	0	7	7
5.12	Other technical positions	35	0	(26)	(26)
	TECHNICAL POSITIONS TOTAL POSITIONS	364	79	(77)	(30)
6.0 SUPERVISORS, COORDINATORS, FOREMEN					
6.1	Supervisors, mineral and metal processing	80	34	(10)	(4)
6.2	Supervisors, mining and quarrying	212	88	(102)	(72)

			<b>Adjusted for Zero Reports</b> <i>(see Section 2.7.1)</i>	<b>Not Adjusted for Zero Reports</b> <i>(see Section 2.7.1)</i>
	<b>Current Workforce 2017</b>	<b>Cumulative Retirements 2017-2027</b>	<b>Workforce (Deficit) Surplus 2027</b>	<b>Workforce (Deficit) Surplus 2027</b>
6.3 Primary production managers (except agriculture)	45	11	(15)	12
6.4 Contractors and supervisors, mechanic trades	93	19	(12)	24
6.5 Engineering managers	12	1	1	5
6.6 Construction managers	5	1	(1)	(1)
6.7 Contractors and supervisors, pipefitting trades	15	7	(7)	(7)
6.8 Other supervisors and managers	164	84	(89)	(89)
<b>SUPERVISORS, COORDINATORS TOTAL POSITIONS</b>	<b>626</b>	<b>245</b>	<b>(235)</b>	<b>(132)</b>

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