

Environmental and Social Monitoring Plan

TABLE OF CONTENTS

1	INTRODUCTION.....	5
1.1	Purpose and Scope.....	5
1.2	Review and Update of the <i>Environmental and Social Monitoring Plan</i>	5
2	Environmental and Social Management System CONSIDERATIONS	6
3	Organisational Responsibilities	7
4	ENVIRONMENTAL AND SOCIAL MONITORING PROGRAM	7
4.1	General Requirements	7
4.2	Development and Maintenance of <i>Environmental and Social Monitoring Plan</i> and the Roşia Montană Project Environmental and Social Monitoring Database	8
4.2.1	Identification/Review of Mandatory Monitoring Requirements:	8
4.2.2	Evaluation and Update of Monitoring Requirements in Current Management Plans	8
4.2.3	Preparation/Update of Environmental and Social Monitoring Plan	8
4.2.4	Distribution for Action	17
4.2.5	Training	17
4.2.6	Preparation and Submittal of Annual Monitoring Report	17
4.2.7	Records Management Considerations	18
4.3	Development and Maintenance of the Roşia Montană Project Environmental and Social Monitoring Database.....	18
5	ENVIRONMENTAL MONITORING PROGRAM.....	19
5.1	Overview of Monitoring by Phase	20
5.1.1	Pre-Construction/Construction Phase Monitoring	20
5.1.2	Operational Phase Monitoring	21
5.1.3	Closure Phase Monitoring	22
5.2	Physical Stability Monitoring	22
5.2.1	Physical Stability Monitoring During the Operational Phase	23
5.2.2	Physical Stability Monitoring During Closure/ Post-Closure	23
5.2.3	Physical Stability Monitoring – Reporting	24
5.3	Chemical Stability Monitoring.....	24
5.3.1	Air Quality Monitoring	24
5.3.2	Surface Water	25
5.3.3	Hydrogeology/Groundwater	27
5.3.4	Reporting - Chemical Stability Monitoring	29
5.4	Biological Monitoring.....	29
5.4.1	Aquatic Biological Monitoring	29
5.4.2	Terrestrial Biology	30
5.5	Quality Assurance/Quality Control (QA/QC) Considerations	31
6	SOCIAL MANAGEMENT PERFORMANCE MONITORING	33
	<u>REFERENCES</u>	34

FIGURES

Figure 2-1: Structural Relationship of Management Plans in the Environmental and Social Management System

Figure 4-1: Monitoring and Reporting Process

TABLES

Table 4.1: Minimum Database Fields/Environmental Monitoring Information Requirements

Table 4.2: Minimum Database Fields/Social Performance Information Requirements

1 INTRODUCTION

1.1 Purpose and Scope

This *Environmental and Social Monitoring Plan* describes the comprehensive program that Roşia Montană Gold Corporation (RMGC) has established to monitor its performance in relation the full range of voluntary or regulation-based environmental and social management requirements that apply to Roşia Montană Project operations. The *Environmental and Social Monitoring Plan* is a key component in the continual improvement process established by the Roşia Montană Project Environmental and Social Management System (ESMS) and documented by the *Environmental and Social Management Plan*. The *Environmental and Social Monitoring Plan* is periodically benchmarked against applicable legal and regulatory requirements, and identifies current environmental (e.g. physical, chemical, air quality, noise, and biological) monitoring protocols as well as the application of other a wide range of other management procedures and practices that will be used to monitor RMGC's social program performance. The specific monitoring requirements established by the *Environmental and Social Management Plan* and other individual environmental or social management plans (e.g. the *Cyanide Management Plan*, the *Tailings Facility Management Plan*, the *Waste Management Plan*, the *Air Quality Management Plan*, the *Noise and Vibration Management Plan*, or *Biodiversity Management Plan*) are specifically included in the scope of the monitoring program embodied herein.

Monitoring inputs from the monitoring requirement sources so identified are captured in a controlled database (referred to hereafter as the Roşia Montană Project Environmental and Social Monitoring Database) that is used as a management tool to support the planning and timely execution of required monitoring actions. Updates to the Roşia Montană Project Environmental and Social Monitoring Database are to be performed on a routine basis to ensure that the monitoring program remains accurate, comprehensive, and suitable for Project needs.

The results of the Project's environmental and social monitoring activities will be compiled, evaluated, and summarised in the Roşia Montană Project *Annual Environmental and Social Monitoring Report*, as discussed in Section 7.0. Among its other purposes, the Annual Environmental and Social Monitoring Report is a key source document for the comprehensive management review process described in Section 6.0 of the *Environmental and Social Management Plan*, and may be published or externally released for information at the discretion of RMGC management. Other types of monitoring reports will be prepared as required by specific regulations or permit conditions.

1.2 Review and Update of the *Environmental and Social Monitoring Plan*

The *Environmental and Social Monitoring Plan* and the Roşia Montană Project Environmental and Social Monitoring Database are subject to periodic review and update over the life of the mining operation, in response to internal and external reviewer comments, regulatory changes, physical changes in mining operations (i.e.

changes from pre-construction, to construction, operational and ultimately to decommissioning and closure phases), stakeholder communications, internal verification and management review results, and other factors. Review and update protocols are presented in Sections 4.5 and 6.0 of the *Roşia Montană Project Environmental and Social Management Plan*. Each version of this plan is subject to the controlled distribution protocols defined in procedure MP-05, “Review, Approval, Controlled Distribution, and Update of Environmental and Social Management System Documents.” Compliance with the requirements of this *Environmental and Social Monitoring Plan* will also be periodically verified in accordance with Section 5.4 of *Environmental and Social Management Plan* and procedure MP-13, “Internal Environmental and Social Management System Performance Verifications.”

2 Environmental and Social Management System CONSIDERATIONS

As shown in Figure 2.1, this plan is one of a suite of environmental or social management plans that have been developed to support the ESMS separately described in the current version of the *Roşia Montană Project Environmental and Social Management Plan*. Collectively, the *Roşia Montană Project Environmental and Social Management Plan* and its lower-tier supporting plans address key operational control needs. These needs have been established in a number of areas for which the Project EIA process has indicated that significant environmental or social impacts are either known to exist or are likely to occur in later phases of the mine life cycle.

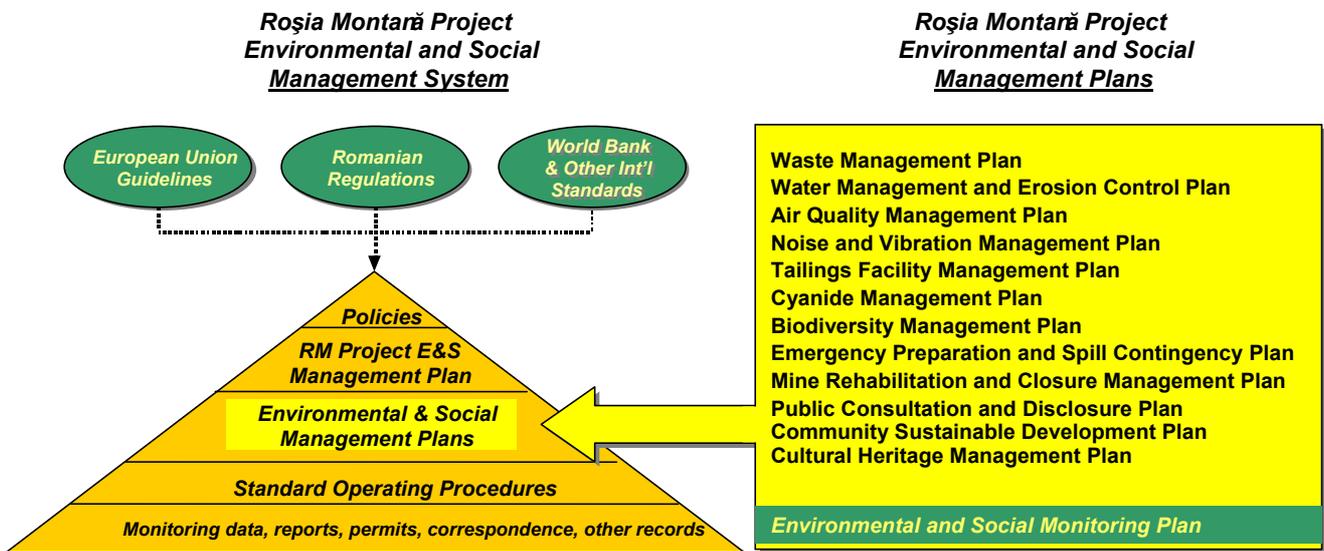


Figure 2-1: Structural Relationship of Management Plans in the Environmental and Social Management System

The implementation of this *Environmental and Social Monitoring Plan* is also supported by a number of detailed, lower-tier Standard Operating Procedures. These procedures are compiled in the *Roşia Montană Project Standard Operating Procedures Manual*, the development, review, approval, distribution, and update of which is controlled by the *Roşia Montană Project Environmental and Social Management Plan*. Other specific document distribution, change control, personnel

training, and records management needs associated with the implementation of this management plan are likewise addressed through various processes and procedures defined by the *Roşia Montană Project Environmental and Social Management Plan*.

This monitoring plan is subject to periodic review and update over the life of the mining operation, in response to internal and external reviewer comments, regulatory changes, changes in mining operations, stakeholder communications, internal audit and management review results, and other factors, as discussed in Sections 4.5 and 6.0 of the *Roşia Montană Project Environmental and Social Management Plan*. Each version of this plan is subject to the distribution protocols defined in procedure MP-05, "Review, Approval, Controlled Distribution, and Update of Environmental and Social Management System Documents."

3 Organisational Responsibilities

Environmental and social monitoring responsibilities are generally shared by the Environmental Department, Community Relations Department, and assigned Production staff, as noted in the specific management plans or Standard Operating Procedures that govern monitoring activities (see **Tables 4.1** and **4.2**). All personnel with monitoring duties will be trained in applicable planning and procedural requirements, in accordance with Section 4.2 of the *Roşia Montană Project Environmental and Social Management Plan* and MP-03, "Environmental and Social Management System Training."

4 ENVIRONMENTAL AND SOCIAL MONITORING PROGRAM

4.1 General Requirements

Section 5.0 of this *Environmental and Social Monitoring Plan* identifies current **environmental** (e.g. physical, chemical, air quality, noise, and biological) monitoring protocols, based on:

- governing legal and regulatory requirements (as documented in MP-02, "Legal and Regulatory Requirements"); and
- various other monitoring requirements established by the *Environmental and Social Management Plan* or individual environmental or social management plans (e.g. the *Cyanide Management Plan*, the *Tailings Facility Management Plan*, the *Air Quality Management Plan*, *Noise and Vibration Management Plan*, the *Waste Management Plan*, or *Biodiversity Management Plan*).

Other **social** monitoring requirements are discussed in Section 6.0 of this document, and, are similarly based on:

- governing legal and regulatory requirements;
- the progress-monitoring requirements associated with actions related to the implementation of the management and mitigation measures recommended

by the EIA process, as documented in MP-16, “Environmental and Social Performance Improvement Process”; and

- other monitoring requirements established by the *Roşia Montană Project Environmental and Social Management Plan* or individual environmental or social management plans as previously noted.

4.2 Development and Maintenance of *Environmental and Social Monitoring Plan* and the Roşia Montană Project Environmental and Social Monitoring Database

The overall process by which this *Environmental and Social Monitoring Plan* and the Roşia Montană Project Environmental and Social Monitoring Database is developed and kept current with the specific phase of mine life is described in **Figure 4-1** and the following subsections.

4.2.1 Identification/Review of Mandatory Monitoring Requirements:

On at least an annual basis, the Environmental Manager/Vice President, Community Development or their designees will evaluate the current Legal, Regulatory, and Other Requirements Register prepared under Section 3.2 of the *Environmental and Social Management Plan* and procedure MP-02, “Identification of Legal and Requirement Requirements.” Mandatory environmental or social monitoring and reporting requirements will be identified.

4.2.2 Evaluation and Update of Monitoring Requirements in Current Management Plans

The monitoring requirements identified in current versions of the Roşia Montană Project Management Plans will be reviewed and compared to the information obtained in the review described in Section 3.2.1, as an element of the management review process described in Section 6.0 of the *Environmental and Social Management Plan* and MP-14, “Management Reviews.” Any required changes or modifications to affected Management Plans will be initiated as appropriate in accordance with Section 4.5 of the *Environmental and Social Management Plan*.

4.2.3 Preparation/Update of Environmental and Social Monitoring Plan

The mandatory monitoring requirements noted in Section 3.2.1 and the other monitoring requirements noted in individual Roşia Montană Project Management Plans will be summarised in **Tables 4.1** and **4.2** of this document. These tables identify (for environmental and social monitoring actions, respectively) the minimum information fields that must be included in the Roşia Montană Project Environmental and Social Monitoring Database, along with minimum monitoring and reporting requirements based on the reviews described in

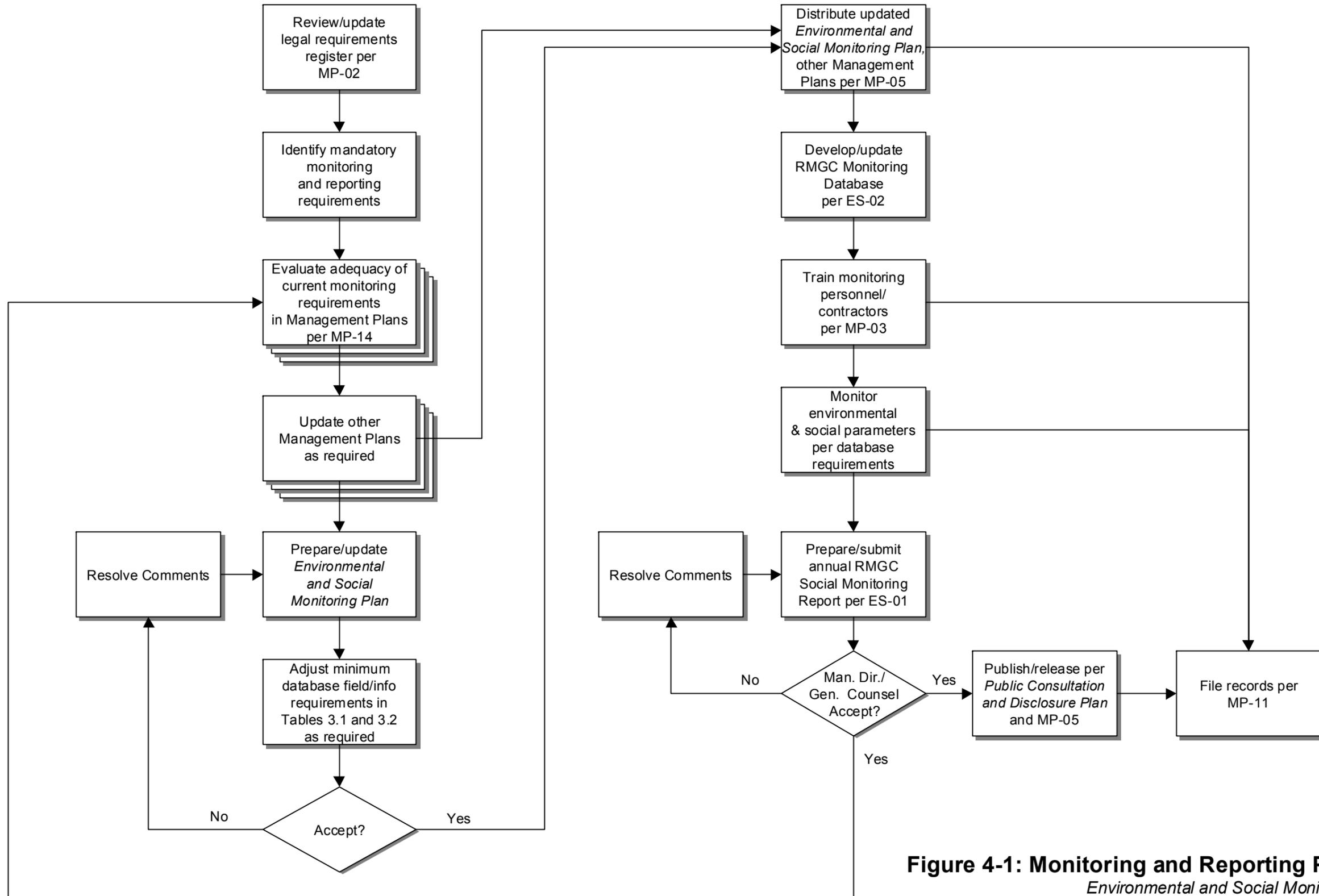


Figure 4-1: Monitoring and Reporting Process
Environmental and Social Monitoring Plan

Table 4.1: Minimum Database Fields/Environmental Monitoring Information Requirements¹

Category of Monitoring	Operational Area	Source of Monitoring Requirement	Monitoring Requirement	Location	Frequency	Method/Standard Operating Procedure	Responsibility	Reporting Requirements	Due date, Next event	Results Field	Comments Field
Physical Stability	Tailings Management Facility	<i>Tailings Facility Management</i>	Routine facility inspections	Per TF-04, "Tailings Management Facility - Operations Inspection" and current facility drawings	TBD ²	Per TF-04, "Tailings Management Facility - Operations Inspection"	TBD	See TF-05, "Tailings Management Facility - Operations Reporting"	TBD	Insert data by event, in format required by noted methods	Insert comments as appropriate, by event
	Process plant, cyanide leaching and cyanide detoxification circuits	<i>Cyanide Management Plan,</i>	Weather monitoring (includes temperature, precipitation, wind speed and direction, and relative humidity)	Per TF-14, "TMF Air Monitoring/Meteorological Facility"	Daily	Per TF-14, "TMF Air Monitoring/Meteorological Facility"	TBD	Per TF-14, "TMF Air Monitoring/Meteorological Facility"	Next day	Insert data by event, in format required by noted methods	Insert comments as appropriate, by event
	Waste rock stockpiles	<i>Water Management and Erosion Control Plan,</i>	Monitoring of effectiveness of erosion control methods	TBD	Monthly or after significant precipitation events	Per WT-14, "Waste Rock Management Erosion Control Considerations "	TBD	Per WT-14, "Waste Rock Management Erosion Control Considerations"	TBD	Insert data by event, in format required by noted methods	Insert comments as appropriate, by event
	Water management system and facility/process plant construction areas	<i>Water Management and Erosion Control Plan,</i>	Monitoring of effectiveness of erosion control methods	TBD	Monthly or after significant precipitation events	Per WT-15, "Water Management Erosion Control Considerations"; <i>Steam Flow Measurement Process Operation Manual</i>	TBD	See WT-15, "Water Management Erosion Control Considerations"	TBD	Insert data by event, in format required by noted methods	Insert comments as appropriate, by event
	Ponds and other water management system earthworks	<i>Water Management and Erosion Control Plan,</i>	Monitoring of effectiveness of soil stabilisation and sediment control methods	TBD	Monthly or after significant precipitation events	Per WT-16, "Soil Stabilisation and Sediment Control"	TBD	See WT-16, "Soil Stabilisation and Sediment Control"	TBD	Insert data by event, in format required by noted methods	Insert comments as appropriate, by event
	Site areas disturbed by earthworks, cutbanks, reclaimed areas	<i>Water Management and Erosion Control Plan,</i>	Monitoring of effectiveness of seeding and revegetation program	TBD	Quarterly	Per WT-17, "Seeding and Revegetation"	TBD	See WT-17, "Seeding and Revegetation"	TBD	Insert data by event, in format required by noted methods	Insert comments as appropriate, by event
	Site areas disturbed by earthworks, cutbanks, reclaimed areas open to grazing	<i>Water Management and Erosion Control Plan,</i>	Monitoring of effectiveness of erosion controls associated with range management issues	TBD	Annually	Per WT-18, "Erosion Control and Range Management"	TBD	See WT-18, "Erosion Control and Range Management"	TBD	Insert data by event, in format required by noted methods	Insert comments as appropriate, by event

¹ The monitoring requirements listed in Tables 4.1 and 4.2 are generally associated with the pconstruction and operational phases of mine life. Currently predicted decommissioning and closure-phase monitoring requirements are documented in the current version of the Project *Mine Rehabilitation and Closure Plan*; these requirements are expected to undergo periodic revisions in response to changing stakeholder input and other project conditions. Final requirements associated with closure/post closure monitoring will be incorporated in this table and the corresponding database prior to the initiation of reclamation and closure actions.

² "TBD" = to be determined; the required detail depends on development of detailed designs and/or the finalisation of supporting SOPs, project organisational details, or other necessary information.

Category of Monitoring	Operational Area	Source of Monitoring Requirement	Monitoring Requirement	Location	Frequency	Method/Standard Operating Procedure	Responsibility	Reporting Requirements	Due date, Next event	Results Field	Comments Field
Chemical Stability – Air Quality	Process plant, cyanide leaching and cyanide detoxification circuits	<i>Cyanide Management Plan,</i>	Weather monitoring (includes temperature, precipitation, wind speed and direction, and relative humidity)	Per TF-14, “TMF Air Monitoring/Meteorological Facility”	Daily	Per TF-14, “TMF Air Monitoring/Meteorological Facility”	TBD	Per TF-14, “TMF Air Monitoring/Meteorological Facility”	Next day	Insert data by event, in format required by noted methods	Insert comments as appropriate, by event
	Process plant, cyanide leaching and cyanide detoxification circuits	<i>Air Quality Management Plan; Cyanide Management</i>	Continuous (alarmed) monitoring of ambient CN concentrations	Per <i>Air Quality Management Plan</i> and <i>Cyanide Management Plan</i> , Section 10.3	Continuous	Per <i>Cyanide Management Plan</i> , Section 10.3	TBD	Per <i>Cyanide Management Plan</i> , Section 10.3	Continuous	Insert data by event, in format required by noted methods	Insert comments as appropriate, by event
	Tailings Management Facility	<i>Tailings Facility Management Plan, Environmental and Social Monitoring Plan</i>	Air particulate level monitoring	Per air particulate level section of TF-14, “Tailings Management Facility – Air Monitoring/ Meteorological Facility” and current facility drawings	TBD	Per air particulate level section of TF-14, “Tailings Management Facility – Air Monitoring/ Meteorological Facility” and current facility drawings	TBD	See TF-14, “Tailings Management Facility – Air Monitoring/ Meteorological Facility”	TBD	Insert data by event, in format required by noted methods	Insert comments as appropriate, by event
	Pit areas, haul roads, landfills, earthworks construction areas	<i>Air Quality Management Plan</i>	Air particulate level monitoring/exhaust emissions monitoring	Per <i>Air Quality Management Plan</i> and ES-07, “Ambient Air Quality Monitoring”	TBD	Per ES-07, “Ambient Air Quality Monitoring”	TBD	See ES-07, “Ambient Air Quality Monitoring”	TBD	Insert data by event, in format required by noted methods	Insert comments as appropriate, by event
Chemical Stability - Surface Water Quality/Quantity	Process plant cyanide leaching system and cyanide detoxification circuit	<i>Cyanide Management Plan,</i>	Monitoring of CN concentrations in detoxified tailings, prior to release to Tailings Management Facility	Process plant cyanide detoxification circuit discharge point	Daily	Per CN-03, “Cyanide Detoxification Plant Operation”	TBD	Per CN-03, “Cyanide Detoxification Plant Operation”	Next day	Insert data by event, in format required by noted methods	Insert comments as appropriate, by event
	Tailings Management Facility	<i>Tailings Facility Management</i>	Surface water monitoring	Per ES-04, “Management of the Roşia Montană Project Surface and Groundwater Quality Monitoring Program”;	TBD	<i>Steam Flow Measurement Process Operation Manual</i>	TBD	<i>Steam Flow Measurement Process Operation Manual</i>	TBD	Insert data by event, in format required by noted methods	Insert comments as appropriate, by event
	Domestic Wastewater Treatment plant	<i>Environmental and Social Monitoring Plan,</i>	Routine influent and effluent monitoring	Per ES-06, “Sampling of Sewage Treatment Plant Effluent”	TBD	Per ES-06, “Sampling of Sewage Treatment Plant Effluent”	TBD	Per ES-06, “Sampling of Sewage Treatment Plant Effluent”	TBD	Insert data by event, in format required by noted methods	Insert comments as appropriate, by event
	Domestic Wastewater Treatment Plant	Domestic Wastewater Treatment Plant vendor’s Operations Manual	Routine monitoring of treatment plant operational performance, as defined by equipment vendor	Per vendor’s Operations Manual	TBD	Per vendor’s Operations Manual	TBD	Per vendor’s Operations Manual	TBD	Insert data by event, in format required by noted methods	Insert comments as appropriate, by event
	Wastewater Treatment Plant	Wastewater Treatment Plant vendor’s Operations Manual	Routine monitoring of treatment plant operational performance, as defined by equipment vendor	Per vendor’s Operations Manual	TBD	Per vendor’s Operations Manual	TBD	Per vendor’s Operations Manual	TBD	Insert data by event, in format required by noted methods	Insert comments as appropriate, by event

Category of Monitoring	Operational Area	Source of Monitoring Requirement	Monitoring Requirement	Location	Frequency	Method/Standard Operating Procedure	Responsibility	Reporting Requirements	Due date, Next event	Results Field	Comments Field
Chemical Stability- Groundwater	Tailings Management Facility	<i>Tailings Facility Management Plan</i>	Groundwater monitoring	Per ES-04, "Management of the Roşia Montană Project Surface and Groundwater Quality Monitoring Program"	TBD	Per ES-04, "Management of the Roşia Montană Project Surface and Groundwater Quality Monitoring Program"	TBD	See ES-04, "Management of the Roşia Montană Project Surface and Groundwater Quality Monitoring Program"	TBD	Insert data by event, in format required by noted methods	Insert comments as appropriate, by event
Chemical Stability- Solid media	Tailings Management Facility	<i>Tailings Facility Management Plan,</i>	Monitoring of tailings chemistry	Per TF-04, "Tailings Management Facility – Operations Inspection"	TBD	Per TF-04, "Tailings Management Facility – Operations Inspection"	TBD	See TF-05, "Tailings Management Facility – Operations Reporting"	TBD	Insert data by event, in format required by noted methods	Insert comments as appropriate, by event
	Waste rock stockpiles	<i>Mine Rehabilitation and Closure Management Plan,</i>	Monitoring of waste rock chemistry for potential segregation purposes	Per <i>Mine Rehabilitation and Closure Management Plan,</i> Section 9 and Table 9-1.	TBD	Per <i>Mine Rehabilitation and Closure Management Plan,</i> Section 9 and Table 9-1	TBD	See <i>Mine Rehabilitation and Closure Management Plan,</i> Section 9 and Table 9-1	TBD	Insert data by event, in format required by noted methods	Insert comments as appropriate, by event
Chemical Stability- Solid media	Wastewater Treatment Plant	<i>Waste Management Plan,</i>	Monitoring of Wastewater Treatment Plant sludge chemistry (to determine applicability of hazardous/municipal waste categories for disposal)	Per <i>Waste Management Plan,</i> Section 8.0	TBD	As directed by Environmental Manager	TBD	As directed by Environmental Manager	TBD	Insert data by event, in format required by noted methods	Insert comments as appropriate, by event
	Domestic Wastewater Treatment Plant	<i>Waste Management Plan,</i>	Monitoring of Domestic Wastewater Treatment Plant sludge chemistry (to determine applicability of hazardous/municipal waste categories for disposal)	Per <i>Waste Management Plan,</i> Section 8.0	TBD	As directed by Environmental Manager	TBD	As directed by Environmental Manager	TBD	Insert data by event, in format required by noted methods	Insert comments as appropriate, by event
Biological - Aquatic	Lakes, ponds, streams, seeps, rivers on or associated with the Roşia Montană Project site	<i>Biodiversity Management Plan,</i>	Monitoring of aquatic species	TBD	TBD	Per BC-07, "Wildlife Monitoring" and ES-08, "Aquatic Biological Monitoring"	TBD	See BC-07, "Wildlife Monitoring" and BC-08, "Recording Rare Species"; and ES-08, "Aquatic Biological Monitoring"	TBD	Insert data by event, in format required by noted methods	Insert comments as appropriate, by event
Biological - Terrestrial	Tailings Management Facility	<i>Tailings Facility Management Plan,</i>	Wildlife mortality monitoring	Tailings Management Facility	Daily	Per CN-05, "Wildlife Mortality Monitoring- Cyanide Facilities"	TBD	See CN-05, "Wildlife Mortality Monitoring- Cyanide Facilities"	Next day	Insert data by event, in format required by noted methods	Insert comments as appropriate, by event
	Cyanide storage and CIL facility	<i>Cyanide Management Plan,</i>	Wildlife mortality monitoring	Cyanide storage and CIL facility	TBD	Ongoing, per CN-05, "Wildlife Mortality Monitoring- Cyanide Facilities"	TBD	See CN-05, "Wildlife Mortality Monitoring- Cyanide Facilities"	TBD	Insert data by event, in format required by noted methods	Insert comments as appropriate, by event
	Roşia Montană Project site and adjacent land areas	<i>Biodiversity Management Plan,</i>	Monitoring of terrestrial species	TBD	TBD	Per BC-07, "Wildlife Monitoring" and ES-09, "Terrestrial Biological Monitoring"	TBD	See BC-07, "Wildlife Monitoring" and BC-08, "Recording Rare Species"; and ES-09, "Terrestrial Biological Monitoring"	TBD	Insert data by event, in format required by noted methods	Insert comments as appropriate, by event

Table 4.2: Minimum Database Fields/Social Performance Information Requirements

Category Of Monitoring	Operational Area	Source of Monitoring Requirement	Monitoring Requirement	Location	Frequency	Method/Standard Operating Procedure	Responsibility	Reporting Requirements	Due date, Next event	Results Field	Comments Field
Regulatory agency contacts	Entire Roşia Montană Project concession	<i>Environmental and Social Management Plan,</i>	Verification of compliance with governing regulations	RMGC operations offices	Annual	Per MP-02, "Identification of Legal and Regulatory Requirements" and MP-09, "Regulatory Compliance Verifications"	Environmental Department staff	See MP-09, "Regulatory Compliance Verifications"	TBD	Insert data by event, in format required by noted methods	Insert comments as appropriate, by event
	Entire Roşia Montană Project concession	<i>Environmental and Social Management Plan,</i>	Monitoring of RMGC's responsiveness to regulatory inquiries, complaints, or request for information	RMGC operations offices	Annual	Per MP-04, "Management of Environmental and Social Complaints and Information Requests"; MP-12, "Internal Environmental and Social Management System Performance Verifications"; and MP-13, "Management Reviews"	Environmental Department staff	See MP-04, "Management of Environmental and Social Complaints and Information Requests"; MP-12, "Internal Environmental and Social Management System Performance Verifications"; and MP-13, "Management Reviews"	TBD	Insert data by event, in format required by noted methods	Insert comments as appropriate, by event
External stakeholder/ community issues	Cyanide Producer	<i>Cyanide Management Plan,</i>	Cyanide producer audit	Cyanide producer's facilities	Once, prior to contract award, periodic at discretion of En. Mgr. thereafter	Audit by contracted third party	Contracted third party	See third-party audit contract	TBD	Insert data by event, in format required by noted methods	Insert comments as appropriate, by event
	Cyanide Transporter	<i>Cyanide Management Plan,</i>	Cyanide transporter audit	Cyanide transporter's facilities/equipment	Periodic, at discretion of Env. Manager	Audit by contracted third party	Contracted third party	See third-party audit contract	TBD	Insert data by event, in format required by noted methods	Insert comments as appropriate, by event
	Entire Roşia Montană Project concession	<i>Waste Management Plan,</i>	<i>Completion and updating of Waste Stream Inventory to keep current. Reporting progress towards waste minimisation targets</i>	N/A	Annual	<i>Environmental and Social Management Plan</i> Section 6.0 and MP-13, "Management Reviews"	Environmental Manager/ Management Review Board	Management Review Report; see MP-13	TBD	Insert data by event, in format required by noted methods	Insert comments as appropriate, by event
	Entire Roşia Montană Project concession	<i>Environmental and Social Management Plan, Sections</i>	Monitoring RMGC's responsiveness to stakeholder inquiries, complaints, or request for information	RMGC operations offices	Annual	Per MP-04, "Management of Environmental and Social Complaints and Information Requests"; MP-12, "Internal Environmental and Social Management System Performance Verifications"; and MP-13, "Management Reviews"	Environmental Department staff	See MP-04, "Management of Environmental and Social Complaints and Information Requests"; MP-12, "Internal Environmental and Social Management System Performance Verifications"; and MP-13, "Management Reviews"	TBD	Insert data by event, in format required by noted methods	Insert comments as appropriate, by event
	Haul roads, blasting operations in pits, processing plant	<i>Noise and Vibration Management Plan,</i>	Ambient noise and vibration monitoring	Haul roads, blasting operations in pits, processing plant	TBD	<i>Per Noise and Vibration Management Plan, Section 6.0</i>	TBD	See <i>Noise and Vibration Management Plan,</i>	TBD	Insert data by event, in format required by noted methods	Insert comments as appropriate, by event
Internal stakeholder/ workforce Health and Safety	Potable water treatment plant and potable water tank	<i>Water Management and Erosion Control Plan,</i>	Monitoring of quantity and quality of raw/treated water against current Romanian potable water quality standards	Potable water treatment plant and potable water tank	TBD	<i>Per Water Management and Erosion Control Plan, Section 3.2.9</i>	TBD	See <i>Water Management and Erosion Control Plan,</i>	TBD	Insert data by event, in format required by noted methods	Insert comments as appropriate, by event

Category Of Monitoring	Operational Area	Source of Monitoring Requirement	Monitoring Requirement	Location	Frequency	Method/Standard Operating Procedure	Responsibility	Reporting Requirements	Due date, Next event	Results Field	Comments Field
Internal stakeholder/ workforce Health and Safety	Tailings Management Facility	<i>Tailings Facility Management Plan</i> , applicable portions of the <i>Occupational Health and Safety Plan</i> and Roşia Montană Project <i>Emergency Preparedness and Spill Contingency Plan</i>	Routine Health and Safety Monitoring	Per TF-11, "Tailings Management Facility – Health and Safety Monitoring"	TBD	Per TF-11, "Tailings Management Facility – Health and Safety Monitoring"	TBD	See TF-11, "Tailings Management Facility – Health and Safety Monitoring"	TBD	Insert data by event, in format required by noted methods	Insert comments as appropriate, by event
	Cyanide off-loading and storage facility	<i>Cyanide Management Plan</i> ,	Routine daily safety inspections	Cyanide off-loading and storage facility	Daily	Per CN-04, "Inspections of Cyanide Tanks, Pipelines, and Other Cyanide Facilities"	TBD	Per CN-04, "Inspections of Cyanide Tanks, Pipelines, and Other Cyanide Facilities"	Next day	Insert data by event, in format required by noted methods	Insert comments as appropriate, by event
	Cyanide off-loading and storage facility	<i>Cyanide Management Plan</i> ,	Cyanide off-loading and storage facility inspections	Perimeter fencing, cyanide off-loading and storage facility	Monthly	Per CN-04, "Inspections of Cyanide Tanks, Pipelines, and Other Cyanide Facilities"	TBD	See CN-04, "Inspections of Cyanide Tanks, Pipelines, and Other Cyanide Facilities"	TBD	Insert data by event, in format required by noted methods	Insert comments as appropriate, by event
	Cyanide off-loading and storage facility	<i>Cyanide Management Plan</i> ,	Perimeter fencing inspection, cyanide off-loading and storage facility	Perimeter fence areas, cyanide off-loading and storage facility	Semi-annually	Per CN-04, "Inspections of Cyanide Tanks, Pipelines, and Other Cyanide Facilities"	TBD	Per CN-04, "Inspections of Cyanide Tanks, Pipelines, and Other Cyanide Facilities"	TBD	Insert data by event, in format required by noted methods	Insert comments as appropriate, by event
	Process plant, cyanide leaching system and detoxification circuit	<i>Cyanide Management Plan</i> ,	Cyanide production facility backup generator inspection	Cyanide production facility backup generators	Periodic, per CN-10 requirements	Per CN-08, "Emergency Power Generation for Cyanide Handling Equipment"	TBD	See CN-08, "Emergency Power Generation for Cyanide Handling Equipment"	TBD	Insert data by event, in format required by noted methods	Insert comments as appropriate, by event
	Cyanide production facility, carbon-in-leach facility area	<i>Cyanide Management Plan</i> ,	Pre-work safety inspections, carbon-in-leach facility area	Cyanide production facility, carbon-in-leach facility area	Daily	Per CN-02, "Carbon-in-Leach Facility Operation"	TBD	See CN-02, "Carbon-in-Leach Facility Operation"	TBD	Insert data by event, in format required by noted methods	Insert comments as appropriate, by event
	Process plant, cyanide leaching system and detoxification circuit	<i>Cyanide Management Plan</i> ,	Routine daily safety inspections	Cyanide production facility	Daily	Per CN-04, "Inspections of Cyanide Tanks, Pipelines, and Other Cyanide Facilities"	TBD	Per CN-04, "Inspections of Cyanide Tanks, Pipelines, and Other Cyanide Facilities"	Next day	Insert data by event, in format required by noted methods	Insert comments as appropriate, by event
	Process plant, cyanide leaching system and detoxification circuit	<i>Cyanide Management Plan</i> ,	Inspections of tanks, piping, valves, and secondary containments	Cyanide production facility tanks, piping, valves, and secondary containments	Monthly	Per CN-04, "Inspections of Cyanide Tanks, Pipelines, and Other Cyanide Facilities"	TBD	See CN-04, "Inspections of Cyanide Tanks, Pipelines, and Other Cyanide Facilities"	TBD	Insert data by event, in format required by noted methods	Insert comments as appropriate, by event
	Process plant	<i>Cyanide Management Plan</i> ,	Perimeter fence inspection	Perimeter fence areas, cyanide production	Semi-annually	Per CN-04, "Inspections of Cyanide Tanks, Pipelines, and	TBD	See CN-04, Inspections of Cyanide Tanks,	TBD	Insert data by event, in	Insert comments as

Category Of Monitoring	Operational Area	Source of Monitoring Requirement	Monitoring Requirement	Location	Frequency	Method/Standard Operating Procedure	Responsibility	Reporting Requirements	Due date, Next event	Results Field	Comments Field
				facility		Other Cyanide Facilities"		Pipelines, and Other Cyanide Facilities"		format required by noted methods	appropriate, by event
	Process plant cyanide leaching system and cyanide detoxification circuit (SO ₂ /air treatment plant)	<i>Cyanide Management Plan,</i>	Routine safety inspections	Process plant cyanide leaching system and cyanide detoxification circuit (SO ₂ /air treatment plant)	Daily	Per CN-04, "Inspections of Cyanide Tanks, Pipelines, and Other Cyanide Facilities"		Per CN-04, "Inspections of Cyanide Tanks, Pipelines, and Other Cyanide Facilities"		Insert data by event, in format required by noted methods	Insert comments as appropriate, by event
Internal stakeholder/ workforce Health and Safety	Process plant cyanide leaching system and cyanide detoxification circuit (SO ₂ /air treatment plant)	<i>Cyanide Management Plan,</i>	Inspections of tanks, piping, valves, secondary containments, other equipment	Process plant cyanide leaching system and cyanide detoxification circuit (SO ₂ /air treatment plant)	Monthly	Per CN-04, "Inspections of Cyanide Tanks, Pipelines, and Other Cyanide Facilities"	TBD	See CN-04, "Inspections of Cyanide Tanks, Pipelines, and Other Cyanide Facilities"	TBD	Insert data by event, in format required by noted methods	Insert comments as appropriate, by event
	Emergency response equipment depots	<i>Emergency Preparedness and Spill Contingency Plan,</i>	Routine (weekly) and detailed(annual) inspections of emergency response equipment	<i>Emergency Preparedness and Spill Contingency Plan,</i> Section 15.1.	Monthly and annually as noted	<i>Per Emergency Preparedness and Spill Contingency Plan,</i> Section 15.1.	TBD	Report results to Health and Safety Manager	TBD	Insert data by event, in format required by noted methods	Insert comments as appropriate, by event
	Site-wide and building-specific alarm systems; community alarm system; communications centre	<i>Emergency Preparedness and Spill Contingency Plan,</i> and applicable portions of the <i>Occupational Health and Safety Plan</i>	Weekly testing of site-wide alarms and annual testing of building-specific and area alarms; biennial testing of community alarms; monthly communications system testing	Site-wide and building-specific alarm systems; community alarm system; communications centre	Weekly, annually, and biennially as noted	<i>Per Emergency Preparedness and Spill Contingency Plan,</i> Section 15.2 and 16.2; and applicable portions of the <i>Occupational Health and Safety Plan</i>	TBD	Report results to Health and Safety Manager/Vice-President, Community Development (community alarm testing only)	TBD	Insert data by event, in format required by noted methods	Insert comments as appropriate, by event
	Bulk storage tanks (less tanks addressed under <i>Cyanide Management Plan</i>)	<i>Emergency Preparedness and Spill Contingency Plan,</i> and applicable portions of the <i>Occupational Health and Safety Plan</i>	Integrity/condition inspections	Facility-wide storage tank areas	Monthly	<i>Per Emergency Preparedness and Spill Contingency Plan,</i> Section 15.3; and applicable portions of the <i>Occupational Health and Safety Plan</i>	Environmental Department staff	Report results to Health and Safety and Environmental Managers	TBD	Insert data by event, in format required by noted methods	Insert comments as appropriate, by event
	Packaged reagent/chemical storage areas	<i>Emergency Preparedness and Spill Contingency Plan,</i> and applicable portions of the <i>Occupational Health and Safety Plan</i>	Integrity/condition inspections	Facility-wide warehouse/storage areas	Monthly	<i>Per Emergency Preparedness and Spill Contingency Plan,</i> Section 15.4; and applicable portions of the <i>Occupational Health and Safety Plan</i>	Environmental Department staff	Report results to Health and Safety and Environmental Managers	TBD	Insert data by event, in format required by noted methods	Insert comments as appropriate, by event
	Explosives magazine	<i>Emergency Preparedness and Spill Contingency Plan,</i> and applicable portions of the <i>Occupational Health and Safety Plan</i>	Integrity/condition inspections	Explosives magazines	Monthly	<i>Per Emergency Preparedness and Spill Contingency Plan,</i> Section 15.7; and applicable portions of the <i>Occupational Health and Safety Plan</i>	Mining Department staff	Report results to Health and Safety and Environmental Managers	TBD	Insert data by event, in format required by noted methods	Insert comments as appropriate, by event
	Emergency response	<i>Emergency Preparedness</i>	Emergency response	Emergency response	Biennially	<i>Emergency Preparedness and</i>	Health and	Report results to Health	TBD	Insert data by	Insert

Category Of Monitoring	Operational Area	Source of Monitoring Requirement	Monitoring Requirement	Location	Frequency	Method/Standard Operating Procedure	Responsibility	Reporting Requirements	Due date, Next event	Results Field	Comments Field
	equipment depots	<i>and Spill Contingency Plan,</i>	equipment deployment drills	equipment depots		<i>Spill Contingency Plan, Section 16.3</i>	Safety Department staff	and Safety Manager		event, in format required by noted methods	comments as appropriate, by event
	Entire Roşia Montană Project site	<i>Emergency Preparedness and Spill Contingency Plan, Section 16.4; and applicable portions of the Occupational Health and Safety Plan</i>	Evacuation and fire drills	Site-wide	Annually	<i>Emergency Preparedness and Spill Contingency Plan, Section 16.4; and applicable portions of the Occupational Health and Safety Plan</i>	Health and Safety Department staff	Report results to Health and Safety Manager	TBD	Insert data by event, in format required by noted methods	Insert comments as appropriate, by event

Sections 3.2.1 and 3.2.2. For each general category of monitoring, **Tables 4.1** and **4.2** will identify, as appropriate:

- the operational areas of the mine site that are affected;
- the specific source(s) of the monitoring requirement;
- references to the specific locations in which each monitoring event will be performed;
- references to applicable monitoring methods or procedures;
- responsible personnel; and
- references to specific reporting requirements.

Data field requirements are also noted to accommodate entry of monitoring results or data, the due date of the next monitoring action, and a field to accommodate free-text commentary.

The updated draft *Environmental and Social Monitoring Plan* will be submitted to the Managing Director; the Director, Community Development, and Director, Permits, Compliance and Management systems (or their designees) for review and approval. Review comments will be resolved prior to document finalisation and distribution

4.2.4 Distribution for Action

The approved *Environmental and Social Monitoring Plan* will be subject to controlled distribution in accordance with MP-05, “Review, Approval, Controlled Distribution, and Update of Environmental and Social Management System Documents.” The contents of the updated **Tables 4.1** and **4.2** will be used to guide any necessary updates or refinements to the Roşia Montană Project Environmental and Social Monitoring Database, in accordance with ES-02, “Management of the Roşia Montană Project Environmental and Social Monitoring Database.”

4.2.5 Training

Monitoring personnel will be trained in the monitoring protocols (i.e. applicable methods, locations, frequencies, data entry, and reporting requirements) associated with their assigned actions, in accordance with MP-03, “Environmental and Social Management System Training” and the requirements noted in the Roşia Montană Project Environmental and Social Monitoring Database.

4.2.6 Preparation and Submittal of Annual Monitoring Report

The Assistant Manager, Community Relations and the Manager, Environmental Management (or their designees) are responsible for the preparation of an annual report in accordance with ES-01, “Preparation and Dissemination of Annual Environmental and Social Monitoring Report.” The report will compile the results of monitoring analyses, present a summary of the conclusions that can be drawn from the data, and highlight any noted trends or specific issues that will need to be addressed through management action. A specific course of action will be proposed for the mitigation or elimination of negative trends or issues, as noted in ES-01. Details of any rehabilitation work carried out over the past year and any proposed for the coming year will also be discussed, along with any project changes that may result in revisions to the closure plan or proposed rehabilitation work. The draft report will be submitted to the Managing Director and RMGC’s General Counsel for their review and comment. Comments will be incorporated prior to controlled

distribution in accordance with MP-05. The Annual Environmental and Social Monitoring Report is considered a key input document to the management review process defined by Section 6.0 of the *Roşia Montană Project Environmental and Social Management Plan*, and may be released to the public at the discretion of the Managing Director and General Counsel, as noted therein.³

4.2.7 Records Management Considerations

Records resulting from the implementation of this *Environmental and Social Monitoring Plan* will include historical files of currently approved and superseded versions of this plan and the other management plans and Standard Operating Procedures that carry specific monitoring requirements; training records; monitoring records; and monitoring data, results, or commentaries, as entered into the Roşia Montană Project Environmental and Social Monitoring Database for a specific monitoring event. Records will be maintained in accordance with MP-12, “Management of Environmental and Social Management System Records.”

4.3 Development and Maintenance of the Roşia Montană Project Environmental and Social Monitoring Database

Procedure ES-02, “Management of the Roşia Montană Project Environmental and Social Monitoring Database” describes the minimum software and hardware platform requirements for the Roşia Montană Project Environmental and Social Monitoring Database, and also contains requirements for:

- data entry;
- data field contents (based on **Tables 4.1** and **4.2** of this *Environmental and Social Monitoring Plan*);
- general user guidelines and update requirements;
- data correction protocols;
- controlled access provisions (and other methods of ensuring the data integrity and quality);
- monitoring data storage functions;
- trend analysis functions;
- hotlinked references; and
- report generation capabilities for routine operational monitoring as well as trend analyses and backup information for the Roşia Montană Project Annual Environmental Monitoring Report.

³ Other reporting requirements to regulatory agencies will be defined in **Tables 4.1** and **4.2** as appropriate, and will depend on the requirements of specific regulations and as defined in the current construction certificate and environmental agreement for sewage systems, industrial sewage works (tailings and pit dewatering) and water works (potable) secured for the mine operation. With the exception of accidents, spills, or other emergency issues (see the *Emergency Preparedness and Spill Contingency Plan*), reporting to regulatory agencies will generally be on an annual basis.

As previously noted, **Tables 4.1** and **4.2** describe the minimum data fields that must be supported by the Roşia Montană Project Environmental and Social Monitoring Database. Because this *Environmental and Social Monitoring Plan* is subject to the review processes noted in Section 3.1 and **Figure 4-1**, **Tables 4.1** and **4.2** and procedure ES-02 will play an important role in ensuring that database inputs are current relative to the monitoring requirements currently invoked by governing regulations, by other Management Plans, or by other elements of the Environmental and Social Management system.

5 ENVIRONMENTAL MONITORING PROGRAM

The *environmental* monitoring elements of the *Environmental and Social Monitoring Plan* are intended to support the determination of the potential effects on specific resources resulting from exploration activities, as well as the actual environmental impacts associated with the construction, operation, decommissioning, and closure of mining facilities. More specifically, the environmental monitoring elements are designed to generate defensible data that can:

- serve as supplemental baseline data;
- be used to ensure that construction, operation, decommissioning, and closure activities proceed as required;
- demonstrate the relative effectiveness of mitigation measures;
- support accurate determinations or predictions of residual impacts;
- support comparisons of changes in the environment against existing baseline conditions, and the distinguishing of project-related impacts from natural (including seasonal) changes;
- help identify unacceptable impacts, thereby enabling the implementation of supplementary mitigation and/or corrective and preventive actions in a timely manner;
- demonstrate field performance of various cover materials, combinations and thicknesses, as well as species / species mixes, for consideration for closure purposes;
- demonstrate continued compliance with applicable environmental legislation, policies, and guidelines as well as specific permit/license requirements;
- ensure accountability through a system of routine reporting to mine management, with summary reports being sent to regulatory agencies;
- support the investigation of environmental incidents and the determination of appropriate corrective and preventive actions; and
- support appropriate responses to specific complaints or requests for information from the general public, regulatory agencies, or other external stakeholders

As noted in **Table 4.1**, environmental monitoring is divided into three types: physical, chemical, and biological stability monitoring, all of which will be conducted during the pre-construction, construction, operation, decommissioning, and closure phases of the project. These phases are described further in the following sections; followed

by a discussion of quality assurance/quality control (QA/QC) requirements and routine monitoring requirements.

5.1 Overview of Monitoring by Phase

5.1.1 Pre-Construction/Construction Phase Monitoring

Pre-construction/construction phase monitoring activities include the collection of data describing background conditions as well as the impacts associated with construction activities. Activities will also include environmental inspection during construction (see ES-03, “Construction Quality Assurance Inspection”) and the collection and analysis of associated monitoring data, along with the monitoring of internal and external stakeholder concerns and considerations via the processes identified in **Tables 4.1** and **4.2**. Such inspections, analyses, and monitoring are required in order to ensure:

- appropriate construction management techniques are being employed, particularly as they relate to erosion and sediment control for construction activities performed adjacent to existing watercourses;
- continued compliance with regulatory requirements and approved construction practices; and,
- that appropriate mitigation measures are specified, implemented, and functioning properly.

ES-03 describes the scheduling of specific monitoring and sampling regimes, as well as ad hoc additional sample collection and analysis in response to unanticipated field conditions that appear potentially problematic. The inspection information so generated will be summarised on an annual basis in accordance with ES-01, “Preparation and Dissemination of Annual Environmental and Social Monitoring Report.” Outstanding environmental issues will be specifically noted, along with the management and mitigation measures or resolution strategies that have been applied.

It is expected that environmental monitoring during the pre-construction and construction phase could also include supplemental baseline surveys to obtain streamflow, rainfall, surface and groundwater quality, biological, and any other environmental data deemed necessary for future use. Technical requirements for such surveys and routing requirements that ensure that survey data are captured in the Roşia Montană Project Environmental and Social Monitoring Database will be issued in directives to internal staff or as procurement conditions to qualified contractors (see MP-07, “Purchasing”). Supplemental surveys will be performed, as applicable, in accordance with the following Roşia Montană Project procedures unless specific contractor procedures or other alternatives are approved by the RMGC Environmental Manager.

- ES-04, “Management of the Roşia Montană Project Surface and Groundwater Quality Monitoring Program”; or

- Applicable biological sampling and surveying practices as specified in the *Biodiversity Management Plan* and Section 2 of the Roşia Montană Project *Standard Operating Procedures Manual*.

5.1.2 Operational Phase Monitoring

Environmental and social monitoring activities for the operational phase of the Project will include the monitoring of air quality; surface water, groundwater, and potable water quantity and quality; noise and vibration; biota; soil, tailings, and waste rock chemistry; and water treatment plant influents and effluents, as necessary to address potential impacts of mine/process plant operation. Ongoing environmental inspections will be conducted, and associated environmental monitoring and social performance data will be collected in order to:

- identify changes or potential impacts to the environment and/or adjacent communities resulting from the daily operation of the mine;
- provide the basis for predicting potential environmental or social impacts;
- prompt appropriate corrective and preventive actions to avoid or mitigate potentially adverse environmental and social impacts;
- ensure that RMGC maintains continuing compliance with currently applicable legal and regulatory requirements, permits, licenses, and environmental endorsements; and,
- ensure that proper procedures, management systems, and training are in place to prevent or respond to spills or other emergencies, as required by the Roşia Montană Project *Emergency Preparedness and Spill Contingency Plan*, the *Occupational Health and Safety Plan*, their supporting procedures, and the associated community emergency plan.

The monitoring sampling regime noted in **Table 4.1** may be adjusted at the direction of the Environmental Manager if additional sample collection and analyses need to be arranged in the event that operational conditions are encountered that require further investigation.

Water quality monitoring, including surface and ground water monitoring, will be conducted during the operational phase to:

- ensure compliance with permit/licenses;
- determine the effectiveness of design and mitigation measures intended to collect potentially contaminated water for treatment prior to release to the environment;
- ensure that there are no operational impacts on the Abrud River, Arieş River, and the Corna Valley, or Roşia Stream systems.

ES-04, “Management of the Roşia Montană Project Surface and Groundwater Quality Monitoring Program” addresses both sampling methodology and current sampling locations.

Visual inspection of material handling areas will be performed as noted in the *Emergency Preparedness and Spill Contingency Plan* to determine if any spills may have occurred and, if so, to determine appropriate remedial actions that might be required. This may include soil sampling for contaminant analysis, in accordance with ES-06, “Environmental Sampling, Surface and Subsurface Soils.”

The sewage treatment plant effluent will be monitored for coliform bacteria, including *E. coli*, in accordance with ES-06, “Sampling of Sewage Treatment Plant Effluent.” Chemical and bacterial (i.e. coliform) analyses will be performed by an accredited Romanian laboratory. Laboratory results will be evaluated through the process described in ES-04, “Management of the Roşia Montană Project Surface and Groundwater Quality Monitoring Program.”

Spent coolants, solvents, used oils, and other potentially hazardous substances will be stored temporarily on-site for off-site recycling or disposal, as noted in the *Waste Management Plan and Emergency Preparedness and Spill Contingency Plan*. An inventory of the amount of material in storage will be kept and updated on a monthly basis, as noted therein. Other hazardous wastes, such as spent batteries, will be kept in a contained, secured area and shipped periodically for off-site disposal. Records of shipment date, volumes and destinations will be kept in accordance with MP-12, “Management of Environmental and Social Management System Records.”

5.1.3 Closure Phase Monitoring

Environmental inspection and monitoring during the closure/post closure phase will be required to confirm that the remediation measures have been properly implemented and are effective. Table 9.1 of the current approved version of the *Mine Rehabilitation and Closure Management Plan* separately summarises an initial iteration of the location, parameters, methods, and frequency of closure/post-closure monitoring requirements. When the phase of mine life is reached in which specific closure/post-closure actions are initiated, the requirements of Table 9.1 will be integrated into **Table 4.1** and the Roşia Montană Project Environmental and Social Monitoring Database via the review and update process described in Section 3.2 of this *Environmental and Social Monitoring Plan*.

5.2 Physical Stability Monitoring

The general purpose of physical stability monitoring is to:

- ensure that physical structures, including berms and impoundments, are functioning as designed and intended;
- identify maintenance requirements in a timely manner; and,
- permit early identification of potentially significant concerns (e.g. signs of loss of structural integrity) to enable implementation of contingency plans, as planned.

Monitoring will be initiated during construction activities and will continue through the operational phase of the mine into closure and post-closure. **Table 4.1** provides additional guidance regarding the physical stability monitoring program, including references that will define monitoring location, parameters, methods, and frequency.

5.2.1 Physical Stability Monitoring During the Operational Phase

During the operational phase, physical stability monitoring will include ongoing visual inspections of the following:

- perimeter, side walls and internal road of open pits for signs of instability, including signs of gully erosion, tension cracks and/or slumping;
- waste material stockpiles for signs of instability, as per above;
- Tailings Management Facility initial and final dam and secondary containment for any signs of potential failure (e.g. tension cracks, erosion around spillway) and signs of seepage, as note in the *Tailings Facility Management Plan*;
- access roads and supply lines for signs of erosion, as noted in the *Water Management and Erosion Control Plan*; and,
- general site inspection for signs of physical stability.

As noted in the *Tailings Facility Management Plan*, instrumentation will be also installed in the Tailings Management Facility initial and final dams for monitoring, including vibrating wire piezometers, survey monuments and slope indicators.

5.2.2 Physical Stability Monitoring During Closure/ Post-Closure

Monitoring of the physical stability of open pits, stockpiles, the Tailings Management Facility, water and other impoundment structures, and spillways will be performed during the closure/post-closure phase in accordance with this document and the *Mine Rehabilitation and Closure Management Plan* and *Water Management and Erosion Control Plan*. The filling rate of the open pits will be monitored, along with access to and stability of the flooded pits. The Tailings Management Facility, plant site and waste rock piles and impoundment structures will be monitored for access and physical stability in accordance with the *Tailings Facility Management Plan*, the *Water Management and Erosion Control Plan*, and other applicable Management Plans as indicated in **Table 4.1**. Inspections of major impoundment structures will typically include visual inspections of the dam crest, slope and toe areas including spillways, piezometric measurements upstream and downstream of the dam plus periodic elevation surveys of crest and toe benchmarks to monitor potential physical movement. Additional visual inspections will be performed during and after extreme high runoff and significant earthquake events.

Inspection of the structures will be most frequent in the early part of the transition period, when on-site personnel will be able to carry out regular surveillance of the structures and vegetation covers and implement immediate improvements. This will be continued until transition rehabilitation measures have been implemented and it has been determined that the covers are stable and vegetation has become well established. Thereafter, complete physical inspections will be carried out on an minimum on an annual basis by a qualified engineer, supplemented by visual inspections and observations by mine personnel on-site for monitoring, maintenance or security purposes. Maintenance requirements, if needed, will be defined in conjunction with each inspection and promptly implemented.

5.2.3 Physical Stability Monitoring – Reporting

Site activities, including monitoring, inspection and implementation of remedial measures will be documented in the Annual Monitoring Report as previously discussed.

5.3 Chemical Stability Monitoring

Chemical monitoring will be conducted for the following:

- potential contaminant concentrations/loadings from on-site sources;
- potential contaminant concentrations/loadings exiting the property boundary;
- potential contaminant concentrations/loadings in downstream and on-site water bodies; and,
- background concentrations/loadings.

The primary purpose of chemical stability monitoring is to detect potential contamination of air, surface water and groundwater associated with the plant site, pit areas, waste rock stockpiles, Tailings Management Facility, and other operational areas. The components of the environment that fall under this monitoring program include air quality, surface water quality and flows, and groundwater levels and quality.

The monitoring program will be adjusted to accommodate changes in the phase of activity through annual review process described in Section 3.2, starting with the pre-production monitoring, which will build on the environmental baseline data collected previously as part of the initial EIA. **Table 4.1** provides more guidance with regard to the monitoring requirements for air, surface water, and groundwater quality for pre-production, operational and post closure, according to the monitoring component, location of monitoring, parameters to be monitored, method, and frequency.

Methods of analysis will be as defined in WT-05, “Water Quality Reporting and Analysis.” The water quality monitoring program will remain flexible in order to permit appropriate response to site conditions and to enable focusing of the program on areas/parameters of concern. The list of monitoring parameters and locations, and sampling frequency will be reviewed on an annual basis subject to the results of the previous year’s monitoring.

5.3.1 Air Quality Monitoring

Air quality has the potential to be affected by operations associated with the mine site. Hence, air quality monitoring in accordance with the *Air Quality Management Plan*, ES-07, “Ambient Air Quality Monitoring”, TF-14, “Tailings Management Facility – Air Monitoring/Meteorological Facility”, and other procedures as referenced therein. Air quality monitoring will be conducted during the construction, operation, decommissioning, and closure phases of the mine, whenever significant quantities of dust-generating materials are being handled or other atmospheric contaminants potentially introduced decommissioning and closure phase monitoring is likely to be minimal, since air quality is expected to return to near baseline conditions once material handling actions cease, facilities have been demolished and disposed of, and cover systems have been installed for selected facilities.

As noted in the *Air Quality Management Plan*, air quality monitoring during the construction phase of the Project will be largely focused on specific workplaces within the Project area. Parameters will be associated with the air quality issues associated with the use of heavy equipment with internal combustion engines and earthmoving or other dust-generating activities, and will include total suspended particulates, breathable particulates, nitrogen oxides (NO₂, N₂O, and NO, commonly referred to collectively as “NOx”) and carbon monoxide (CO). However, during the operation phase, the air-monitoring program will be expanded to include two larger groups of parameters mining and process plant operation. These parameter groups will include:

- **Processing plant:** total suspended particulates, breathable particulates, As, Cd, Cr, Ni, Mn, V, free SiO₂ in total and breathable particulates, HCN, HCl, fuel vapours, NOx and CO; and
- **Quarries, waste rock stockpiles, low grade rock deposits, inert waste landfill, haulage roads, and tailings impoundment:** total suspended particulates, breathable particulates, As, Cd, Cr, Pb, Ni, Mn, V, free SiO₂ in total and breathable particulates, NOx and CO.

The air quality monitoring program will provide data which will enable predicted levels of impact to be confirmed. The monitoring program will also ensure that unacceptable impacts are not occurring. Should unacceptable impacts be verified, the monitoring program will allow for the timely implementation of supplementary mitigation measures and/or contingency plans. **Table 4.1** provides additional guidance regarding the air quality monitoring program, including location, parameters, method, and frequency.

5.3.2 Surface Water

Surface water provides a potential pathway for contaminants to leave the mine site and affect the downstream aquatic environment. Surface water quality monitoring will be conducted throughout the pre-construction, construction, operation, decommissioning, and closure phases of the mine to ensure that unacceptable impacts are not occurring and, if so, to enable timely implementation of supplementary mitigation measures and/or contingency plans. In addition, surface monitoring will provide an important feedback loop in confirming the predicted levels of impact and, with respect to the closure plan, identifying when conditions have stabilised.

The following describes the proposed surface water monitoring program by phase. **Table 4.1** provides additional guidance regarding the water quality monitoring program, including sampling locations, parameters, method and frequency.

5.3.2.1 Pre-Production Phase Surface Water Quality Monitoring

Water quality monitoring during the pre-production phase will be conducted to obtain data related to five main issues. These are:

- seasonal water quality;
- potable water quality (from the Arieş River);
- dewatering activities monitoring;
- water quality concerns resulting from other construction activities; and,

- Abrud and Arieş River water levels (also monitored during groundwater monitoring).

Pre-production monitoring for water quality will be conducted to augment the environmental baseline data, to provide an ongoing historical record of water quality, and to ensure that construction activities proceed as required and that the construction mitigation measures are effective. A major focus of the pre-operational water quality-monitoring program will focus on construction activities, particularly those downstream of the proposed impoundment structures. Monitoring during pre-construction and construction will include:

- water quality sampling for a reduced scope of parameters representing the parameters of greatest interest during construction;
- water quality sampling for an expanded scope of parameters on a less frequent basis; and,
- frequent (daily or more frequently) *in situ* testing for turbidity as a surrogate for total suspended sediment (TSS) to allow rapid response to a potential deterioration in water quality conditions; and
- pump flow rates and impoundment water levels.

Conditions are expected to vary significantly depending on current construction activities and may warrant a number of modifications of the sampling protocols.

5.3.2.2 Operational Phase Surface Water Quality Monitoring

Water quality monitoring during the operational phase will be conducted to obtain data related to:

- compliance monitoring of effluent quality with respect to the Construction Authorisation (permit) discharge limits;
- monitoring of the receiving water bodies (the Abrud and Arieş River systems) to verify that there are no operational impacts;
- monitoring of the plant site, waste rock stockpile runoff ponds, catchment dam, tailings, and seepage collection impoundments;
- potable water monitoring to determine its suitability as drinking water;
- visual inspection of material handling areas as required by the *Emergency Preparedness and Spill Contingency Plan*.

The monitoring program may be adjusted at the discretion of the Environmental Manager based upon inspection of the site, report of site issues, or review of monitoring data.

5.3.2.3 Closure and Post-Closure Phase Surface Water Quality Monitoring

Closure and post-closure monitoring will focus on meeting the objectives of the latest iteration of the *Mine Rehabilitation and Closure Management Plan*. Accordingly, the closure and post-closure monitoring program will include:

- monitoring of the tailings management system to determine when conditions have stabilised and treatment is no longer required;
- monitoring of the run-off from the plant site and waste rock areas to ensure conditions have stabilised and treatment is no longer required;
- monitoring of the pit water level to document the rate of filling;
- monitoring of the pit water quality ; and
- monitoring of the receiving water body (the Abrud River system) to verify that there are no closure phase impacts.

Closure monitoring will be conducted until it can be demonstrated that conditions have generally stabilised, pursuant to the requirements of the final approved version of the Roşia Montană Project *Mine Rehabilitation and Closure Management Plan*.

5.3.3 Hydrogeology/Groundwater

The purpose of the proposed hydrogeology/groundwater monitoring program is to ensure that environmental impacts do not exceed expectations throughout the pre-construction, construction, operation, decommissioning, and closure phases of the mine. Should unacceptable impacts occur, they will be addressed in accordance with the corrective and preventive action processes described in the *Environmental and Social Management Plan*.

The hydrogeological monitoring programs for each phase are discussed below

5.3.3.1 Pre-Production Phase Groundwater Monitoring

During the pre-production phase, the groundwater monitoring program will consist of the installation of additional groundwater monitors and data collection regarding groundwater quality and seasonal groundwater level fluctuations. The new boreholes will be tied into the existing elevation survey. Monitoring activities for groundwater during the pre-production phase will include:

- measuring water levels monthly in all groundwater monitoring wells per ES-02, "Management of the Roşia Montană Project Environmental and Social Monitoring Database" in order to provide a minimum of at least one year of data; and
- evaluating groundwater quality in selected wells, also per ES-04 requirements.

Data from the pre-production phase monitoring program will be used in the assessment of the potential impact on groundwater levels, as well as groundwater quality from the dewatering of the open pits, process water supply wells, and of potential infiltration from the Tailings Management Facility and waste rock stockpiles.

5.3.3.2 Operational Phase Groundwater Monitoring

Operational phase groundwater monitoring will address the potential effect of mine operations (e.g. pit dewatering, Tailings Management Facility seepage collection dams, waste rock piles) on groundwater quality and groundwater flow patterns. The monitoring program will be designed for early detection of changes in groundwater levels or groundwater chemistry that may require mitigation.

Monitoring activities will include:

- quarterly measurement of water levels to monitor the impact of mine operations on groundwater levels, in accordance with ES-02, “Management of Roşia Montană Project Environmental and Social Monitoring Database”; and
- semi-annual sampling of groundwater quality at the locations indicated the current iteration of the Roşia Montană Project Environmental and Social Monitoring Database.

The monitoring program will be reviewed periodically as noted in Section 3.2.5; new monitoring wells will be added for water quality testing, or existing wells deleted from the program, as appropriate based on review of the previous year’s data.

5.3.3.3 Closure and Post-Closure Phase Groundwater Monitoring

The purpose of the proposed hydrogeological monitoring program during closure and post-closure is to ensure that environmental impacts are addressed through post-closure and to evaluate the residual impacts of the undertaking. The closure and post-closure monitoring program will be developed with reference to the data collected and impacts evaluated during the operational phase. The following outlines a preliminary monitoring plan for the post-closure phase (note: modifications may be implemented depending on the operational phase results):

- quarterly measurement of groundwater levels in accordance with ES-04, “Management of the Roşia Montană Project Surface and Groundwater Quality Monitoring Program” after the open pits have been rehabilitated through flooding, subject to review based on water level recovery;
- monitoring wells in the operational program will continue to be measured in the closure/post-closure phase; and
- annual monitoring of groundwater quality downgradient of the waste rock stockpile and the tailings dam.

Monitors and chemical parameters analysed are likely to be the same as analysed through operational phase. The frequency of analysis and the suite of parameters are to be reviewed based on operational and early closure data.

This activity should determine whether or not a groundwater plume exists that may create a negative impact on water quality of Corna and Roşia Stream and the Abrud River that emanates from the waste rock stockpile or the tailings containment area. Additional monitoring wells may need to be installed if such a plume is detected.

Proposed monitoring locations for post-closure will be documented in appropriate updates to the Roşia Montană Project Environmental and Social Monitoring Database, as noted in ES-02, “Management of the Roşia Montană Project Environmental and Social Monitoring Database.”

5.3.4 Reporting - Chemical Stability Monitoring

The Annual Environmental and Social Monitoring Report will include pertinent information and compiled data obtained from the chemical stability monitoring activities conducted in the preceding year. Reporting will be conducted throughout the pre-production, operational, and into the closure/post-closure phase. The frequency of reporting in the post-closure phase will be revisited, depending on the assessment of conditions.

The chemical stability section of the Annual Environmental and Social Monitoring Report will include:

- a map showing all surface water and groundwater sampling stations;
- surface water, groundwater, potable water and effluent analytical results;
- flow estimates/measurements in the Abrud and Arieş Rivers;
- water level data and hydrographs for the pit following flooding at closure;
- groundwater elevation data and hydrographs;
- air quality monitoring results;
- sediment analysis;
- visual assessment information; and,
- any new borehole locations and logs.

Information will be presented in the form of tables and graphs, and the data will be analysed with regard to the expected effect of mine operation. The annual chemical stability monitoring report will also suggest improvements or other suitable modifications to the monitoring program for the ensuing year.

5.4 Biological Monitoring

Biological monitoring will be performed in accordance with ES-08, “Aquatic Biological Monitoring” and ES-09, “Terrestrial Biological Monitoring.”

The overall program for biological monitoring is summarised in **Table 4.1** and is described in the following sections for the three phases of the mine project.

5.4.1 Aquatic Biological Monitoring

5.4.1.1 Pre-production Phase Aquatic Biological Monitoring

Aquatic biological monitoring during pre-production will include seasonal benthic sampling of the Roşia and Corna Stream systems and the Abrud River. In addition, opportunistic viewing of fish spawning behaviour or signs of habitat degradation will be documented. Data derived during this period will be used to determine the quality of the habit potentially affected, assess the presence or likelihood of fish

populations, and determine what, if any, fish compensation requirements are warranted.

5.4.1.2 Operational Phase Aquatic Biological Monitoring

The aquatic biological monitoring program during operations will be implemented to confirm the assumptions used in determining fish compensation requirements, and identify areas of concern during operation. The data will be reviewed in consideration of available water quality data, in order to provide for a more complete understanding of aquatic habitat conditions in the Abrud River, Roşia Stream system; and Corna Stream system.

5.4.1.3 Closure and Post-closure Phase Aquatic Biology Monitoring

Closure and post-closure aquatic biological monitoring will continue on the Roşia and Corna Stream systems to determine the rate of water quality and habitat recovery within these systems, and to ascertain and develop any further rehabilitation measure which may be required.

5.4.1.4 Reporting – Aquatic Biology

During the closure/post-closure phase, a discussion of monitoring results in the Roşia/Corna Stream systems will be included in the Annual Environmental and Social Monitoring Report that describes the methodology used, summarises results, and recommends appropriate rehabilitation measures if required.

5.4.2 *Terrestrial Biology*

Monitoring of the terrestrial environment during pre-production, operations and closure/post-closure will include visual inspection of natural vegetation and reporting of wildlife presence or wildlife incidents in accordance with BC-07, “Wildlife Monitoring” and CN-05, “Wildlife Mortality Monitoring – Cyanide Facilities, as appropriate. More specific monitoring of vegetation will include the preparation of test plots during the operational phase, and follow up monitoring of reseeded areas during post closure, as noted in BC-05, “Habitat Restoration.”

5.4.2.1 Pre-Production Terrestrial Biological Monitoring

Clearing activities will be conducted in accordance with the *Biodiversity Management Plan*, in order to ensure that such operations are restricted to those areas requiring clearing and are conducted in a manner consistent with the methods outlined in the EIA. Construction vehicles will be restricted to the construction site and will not be permitted into natural areas outside the construction site, causing undue loss of vegetation. Opportunistic viewings of wildlife should be documented as noted in BC-07, “Wildlife Monitoring.” In the event a Critically Endangered, Endangered or Vulnerable species is encountered, steps will be taken to preserve and re-locate the plant(s) or animal(s) where practicable, in accordance with BC-03, “Relocation Specimen Flora and Rare Plants” or BC-08, “Recording Rare Species.”

5.4.2.2 Operational Phase Terrestrial Biology Monitoring

Test plots will be established during the progressive rehabilitation of the mine facilities during the operational phase, as note in the *Biodiverstiy Management Plan*. The purpose of the test plots is to:

- determine the effectiveness of the various reclamation vegetation methods (considering local climatic, terrain, slope stability and erosion, and soil conditions);
- determine the success of selected species/species mixes;
- investigate transplanting; and
- incorporate wildlife habitat enhancement features.

Test plots will be established on portions of each of the major mine facilities accessible during operations (e.g. the tailings facility and the waste rock stockpiles). A range of potential methods such as hydroseeding, broadcast seeding, or transplanting) will be investigated by the test plots for a variety of amendments, seed mixes and rates of application, seasonal conditions and localised conditions. Preliminary greenhouse trials may be used prior to establishing test plots to select the most promising methods for localised conditions. Monitoring of test plots will be ongoing over the life of the mine, once progressive rehabilitation has been initiated. Test plots will be visually inspected and photographed on a regular basis (daily after revegetation until the vegetation has become established and a minimum of once per week thereafter during the growing season). Characteristics to be recorded include:

- rate of germination following seeding;
- vegetative growth and root development;
- signs of erosion/slope failure; and,
- short term and long term success of transplants.

5.4.2.3 Closure and Post-Closure Terrestrial Biology Monitoring

Follow-up monitoring will be undertaken following reseeded of disturbed areas, in accordance with the current version of the *Biodiversity Management Plan*. The purpose of this monitoring will be to identify any site-specific problem areas that require additional treatment or restoration work; and refine the reclamation methods as necessary to increase the level of success. Monitoring will be conducted in areas where vegetation reclamation has been undertaken and will consist primarily of visual inspection.

5.5 Quality Assurance/Quality Control (QA/QC) Considerations

The monitoring program will include the following measures to ensure a high degree of confidence in the data:

- strict compliance with standard procedures for collection, preservation, storage, handling and shipping of samples (see WT-06, “Groundwater Quality Sampling”; and WT-04, “Surface Water Quality Sampling”);
- documentation of any unusual conditions or deviation from the protocols, as part of the sampling procedures;
- a field quality control program for analytical samples (see, ES-04, “Management of the Roşia Montană Project Surface and Groundwater Quality Monitoring Program”) that includes submission of travel and field blanks and duplicate samples to test the

purity of chemical preservatives, to check for contamination of sample bottles and other equipment used in sample collection or handling, and to detect other systematic or random errors introduced between the time of sampling and analyses;

the establishment of laboratory QA/QC standards as part of procurement conditions (including laboratory certification);

validation of data in accordance with ES-04, “Management of the Roşia Montană Project Surface and Groundwater Quality Monitoring Program”

timely review of analytical results to identify areas of concern (including methodology and potential impacts).

6 SOCIAL MANAGEMENT PERFORMANCE MONITORING

Monitoring requirements associated with the performance of RMGC's social programs will be based on any applicable legal and regulatory requirements as well as the progress-monitoring requirements associated with actions related to the implementation of the management and mitigation measures recommended by the Environmental Impact Assessment (EIA) process, as documented in MP-16, "Environmental and Social Performance Improvement Process." Other performance monitoring actions include:

- periodic verifications of compliance with legal and regulatory requirements, per Section 5.1 and MP-09, "Regulatory Compliance Verifications"
- periodic inspections of any element of the Roşia Montană Project Environmental and Social Management System, using the protocols established by MP-08, "Surveillance Inspection";
- comprehensive performance verifications, as discussed in MP-13, "Internal Environmental and Social Management System Performance Verifications"; and
- comprehensive management reviews, conducted annually in accordance with MP-14, "Management Reviews" to ensure the adequacy and suitability of the suite of plans and procedures that comprise the Roşia Montană Project Environmental and Social Management System.

Other monitoring requirements established by the *Environmental and Social Management Plan* or individual environmental social management plans are listed in **Table 4.2**. Monitoring issues associated with the health and safety of the RMGC and contractor workforce are also included.

REFERENCES

EXTERNAL REFERENCES

None

ROŞIA MONTANĂ PROJECT ENVIRONMENTAL AND SOCIAL MANAGEMENT SYSTEM REFERENCES⁴

Public Consultation and Disclosure Plan
Resettlement and Relocation Action Plan
Air Quality Management Plan
Water Management and Erosion Control Plan
Tailings Facility Management Plan
Cyanide Management Plan
Waste Management Plan
Emergency Preparedness and Spill Contingency Plan
Biodiversity Management Plan
Cultural Heritage Management Plan
Noise and Vibration Management Plan
Mine Rehabilitation and Closure Management Plan
Environmental and Social Monitoring Plan

Roşia Montană Project Standard Operating Procedures Manual

- BC-03, “Relocation Specimen Flora and Rare Plants”
- BC-05, “Habitat Restoration”
- BC-07, “Wildlife Monitoring”
- BC-08, “Recording Rare Species”
- CN-05, “Wildlife Mortality Monitoring – Cyanide Facilities”
- ES-01, “Preparation and Dissemination of Annual Environmental and Social Monitoring Report”
- ES-02, “Management of the Roşia Montană Project Environmental and Social Monitoring Database”
- ES-03, “Construction Quality Assurance Inspection”
- ES-04, “Management of the Roşia Montană Project Surface and Groundwater Quality Monitoring Program”;
- ES-05, “Environmental Sampling, Surface and Subsurface Soils”
- ES-06, “Sampling of Sewage Treatment Plant Effluent”
- ES-07, “Ambient Air Quality Monitoring”
- ES-08, “Aquatic Biological Monitoring
- ES-09, “Terrestrial Biological Monitoring”
- MP-02, “Identification of Legal and Regulatory Requirements”;
- MP-03, “Environmental and Social Management System Training”;
- MP-04, “Management of Environmental and Social Complaints and Information Requests”;

⁴ Note: all documents listed are controlled documents per Section 4.5 of the *Roşia Montană Project Environmental and Social Management Plan*; current approved versions shall be assumed to apply in all cases.

- MP-05, “Review, Approval, Controlled Distribution, and Update of Environmental and Social Management System Documents”;
- MP-06, “Preparation of Standard Operating Procedures”;
- MP-07, “Purchasing”;
- MP-08, “Surveillance Inspection”;
- MP-09, “Regulatory Compliance Verifications”;
- MP-10, “Calibration and Maintenance of Measuring and Test Equipment”;
- MP-11, “Corrective and Preventive Action for Environmental and Social Action Program Non-conformances”;
- MP-12, “Management of Environmental and Social Management System Records”;
- MP-13, “Internal Environmental and Social Management System Performance Verifications”;
- MP-14, “Management Reviews”;
- MP-16, “Environmental and Social Performance Improvement Process”; and
- TF-14, “Tailings Management Facility – Air Monitoring/Meteorological Facility.”