

**"APPROVED"**

**Deputy Chairman of the**

**Management Board**

**chief operating officer**

**JSC "Technological Metals**

**Combine of Uzbekistan"**

**Ruziyev U.N.**

**" 11.05.2026 y.**

*N<sup>o</sup> 167-03/03*

**TEXNIK TOPSHIRIQ**

**Sarikul volfram konini o'zlashtirish loyihasi uchun texnogen chiqindi omborini mufassal loyihalash bo'yicha**

**TECHNICAL SPECIFICATION**

**TSF Detail Engineering for Sarikul Tungsten Project**

**Tashkent 2026**

<b>Scope of Work for the TSF Detail Engineering</b>	<b>Texnogen chiqindi omborining batafsil muhandisligi uchun ish ko'lami</b>
<p><b>Project:</b> Sarykul Project</p> <p><b>Client:</b> Uzbekistan Technological Metals Complex JSC</p> <p><b>Document basis:</b> Scope of Work for the TSF Detail Engineering, Rev 1</p> <p><b>Date:</b> 13.05.2026</p>	<p><b>Loyiha:</b> Sariqko'l loyihasi</p> <p><b>Buyurtmachi:</b> "O'zbekiston texnologik metallar kombinati" AJ</p> <p><b>Hujjat asosi:</b> Texnogen chiqindi omborining batafsil muhandisligi uchun Ish ko'lami, 1-tahrir</p> <p><b>Sana:</b> 13.05.2026</p>
<b>1. Introduction</b>	<b>1. Kirish</b>
<p>TMK – “Uzbekistan Technological Metals Complex” JSC (“<i>TMK</i>” or “<i>the Client</i>”) invites qualified TSF detail engineering companies (“<i>the Contractor</i>”) to submit proposals for the TSF detail engineering for the Sarikul Tungsten Project.</p> <p>TMK is Uzbekistan’s leading critical minerals enterprise, managing more than 100 assets and R&amp;D initiatives across 25 strategic mineral commodities. The Sarikul Tungsten Project is a priority development under TMK’s “Metals of the Future” programme and represents one of the country’s most prospective tungsten opportunities.</p> <p>The Sarikul Project area is characterized by complex mountainous terrain with steep slopes, seasonal watercourses, valley systems, and diverse ecological zones. Access is currently via a combination of paved and unpaved roads, with several constraints that may influence future infrastructure planning.</p> <p>The Project is located in the village of Sarykul, approximately 48 km from Samarkand. The site, situated about 700 m from the main road, is accessible via a paved asphalt road.</p>	<p>TMK – "O'zbekiston Texnologik Metallar Kombinati" AJ (keyingi o'rinlarda <i>TMK</i> yoki <i>buyurtmachi</i> deb yuritiladi) texnogen chiqindi omborini mufassal loyihalash bo'yicha malakali kompaniyalarni (keyingi o'rinlarda <i>pudratchi</i> deb yuritiladi) Sarikul volfram loyihasining texnogen chiqindi omborini mufassal loyihalash bo'yicha o'z takliflarini taqdim etishga taklif qiladi.</p> <p>TMK O'zbekistonning muhim minerallar sohasidagi yetakchi korxonasi bo'lib, 25 ta strategik mineral xomashyo turlari bo'yicha 100 dan ortiq aktivlar hamda R&amp;D tashabbuslarini boshqaradi. Sarikul volfram konini o'zlashtirish loyihasi TMKning "Kelajak metallari" dasturi doirasida amalga oshirilayotgan ustuvor yo'nalish bo'lib, mamlakatdagi eng istiqbolli volfram obyektlaridan biri hisoblanadi.</p> <p>Sarikul loyihasi hududi tik nishabliklarga ega murakkab tog'li relyef, mavsumiy suv oqimlari, vodiy tizimlari va turli xil ekologik zonalar bilan ajralib turadi. Hozirgi vaqtda hududga kirish qattiq qoplamali va tuproqli yo'llar orqali amalga oshirilmoqda, biroq kelajakdagi infratuzilmani rejalashtirishga ta'sir qilishi mumkin bo'lgan bir qator cheklovlar mavjud.</p> <p>Loyiha Samarqand shahridan taxminan 48 km masofada joylashgan Sarikul shaharchasida joylashgan. Asosiy yo'ldan qariyb 700 metr</p>

<p>This document has been prepared to support the Client in the development of a Request for Proposal (RFP) package intended for third-party engineering firms. Its purpose is to clearly communicate the expected scope, deliverables, and technical responsibilities required for the design and assessment of tailings storage facilities (TSF) and associated infrastructure across the Client's various projects. By defining these expectations in advance, the Client ensures consistency, transparency, and comparability during the proposal evaluation process..</p> <p>The Scope of Work outlines the full set of engineering tasks that prospective engineering firms may be expected to undertake. These tasks generally include:</p> <ul style="list-style-type: none"> <li>• Planning, managing, and interpreting geotechnical and hydrogeological investigations;</li> <li>• developing geological, geotechnical, and hydrogeological models;</li> <li>• completing surface water management and system designs;</li> <li>• preparing detailed TSF and earthwork designs;</li> <li>• supporting the preparation of construction bidding documents;</li> <li>• and supplying technical review, reporting, and follow-up documentation as required.</li> </ul>	<p>uzoqlikda joylashgan ushbu maydonga asfaltlangan yo'l orqali borish mumkin.</p> <p>Ushbu hujjat Buyurtmachiga uchinchi tomon muhandislik kompaniyalari uchun mo'ljallangan Taklif so'rovi (RFP) to'plamini ishlab chiqishda ko'maklashish maqsadida tayyorlangan. Uning maqsadi Buyurtmachining turli loyihalari doirasida qoldiqlarni saqlash inshootlarini (TEXNIK CHIQINDI OMBORI/TSF) va tegishli infratuzilmani loyihalash hamda baholash uchun talab qilinadigan kutilayotgan ish ko'lami, topshiriladigan natijalar va texnik majburiyatlarni aniq yetkazishdir. Ushbu kutilmalarni oldindan belgilab olish orqali, Buyurtmachi takliflarni baholash jarayonida izchillik, shaffoflik va taqqoslanuvchanlikni ta'minlaydi. Ish ko'lami potentsial muhandislik kompaniyalari bajarishi kutilayotgan muhandislik vazifalarining to'liq to'plamini belgilaydi. Bu vazifalarga odatda quyidagilar kiradi:</p> <ul style="list-style-type: none"> <li>• Geotexnik va gidrogeologik qidiruv ishlarini rejalashtirish, boshqarish va talqin qilish;</li> <li>• geologik, geotexnik va gidrogeologik modellarni ishlab chiqish;</li> <li>• yer usti suvlarini boshqarish va tizim dizaynlarini yakunlash;</li> <li>• TEXNIK CHIQINDI OMBORI va yer ishlari bo'yicha batafsil loyihalarni tayyorlash;</li> <li>• qurilish bo'yicha tender hujjatlarini tayyorlashni qo'llab-quvvatlash;</li> <li>• va kerak bo'lganda texnik ko'rib chiqish, hisobot berish va keyingi hujjatlarni taqdim etish.</li> </ul>
<p><b>2. Objectives</b></p>	<p><b>2. Maqsadlar</b></p>
<p>The purpose of this Technical Specification is to define the scope, contractor responsibilities, and deliverables for the Tailings Storage Facility (TSF) Design Services for the Sarykul Project, ensuring that the design is:</p>	<p>Ushbu Texnik topshiriqning maqsadi Sarikul loyihasi uchun texnogen chiqindi omborini loyihalash xizmatlari bo'yicha ishlar ko'lami, pudratchining majburiyatlari hamda topshiriladigan ish natijalarini (hujjatlarni) belgilash va loyihaning quyidagi talablarga javob berishini ta'minlashdan iborat:</p>

<p>compliant with international standards, safe, operable, and environmentally responsible, and aligned with IFC, CDA/MAC guidelines, and applicable local regulations. The services shall include preliminary design, detailed design, tender documentation, and construction-level drawings/documents.</p>	<p>xalqaro standartlarga muvofiq bo'lishi; xavfsiz, ekspluatatsiya qilish uchun qulay (ishchi holatda) va ekologik jihatdan mas'uliyatli bo'lishi; hamda IFC, CDA/MAC ko'rsatmalariga va amaldagi mahalliy me'yoriy qoidalarga mos kelishi. Xizmatlar o'z ichiga dastlabki loyihalash, mufassal loyihalash, tender hujjatlarini tayyorlash hamda qurilish bosqichi uchun mo'ljallangan (ishchi) chizmalar va hujjatlarni qamrab olishi shart.</p>
<p><b>3. Nomenclature</b></p>	<p><b>3. Nomenklatura</b></p>
<p><b>TMK/Client:</b> Uzbekistan Technological Metal Complex <b>TSF:</b> Tailings storage facility <b>WDS:</b> Waste dump storage <b>SWM:</b> Surface water management <b>SOW:</b> Scope of works <b>MoM:</b> Minutes of the meeting <b>TEM:</b> Technical memorandum <b>GI:</b> Geotechnical investigation <b>IFC:</b> Issued for construction <b>FS:</b> Feasibility study</p>	<p><b>TMK/Buyurtmachi:</b> O'zbekiston texnologik metallar kombinati <b>TSF:</b> Texnogen chiqindi ombori <b>WDS:</b> Chiqindilarni saqlash joyi (ag'darma) <b>SWM:</b> Yer usti suvlarini boshqarish <b>SOW:</b> Ishlar ko'lami <b>MoM:</b> Uchrashuv bayonnomasi <b>TEM:</b> Texnik memorandum <b>GI:</b> Geotexnik qidiruv <b>IFC:</b> Qurilish uchun berilgan (Ishchi chizmalar) <b>FS (TIA):</b> Texnik-iqtisodiy asoslash(JORC)</p>
<p><b>4. Scope of Work</b></p>	<p><b>4. Ishlar ko'lami</b></p>
<p><b>Phase A1 - Geotechnical and Hydrogeological Works</b></p>	<p><b>A1-bosqich - Geotexnik va gidrogeologik ishlar</b></p>
<p><b>A1.1 Supervision of Borehole Drillings, Trial Pits, and In-Situ Tests</b></p> <p>Boreholes and trial pits shall be supervised by the Consultant's experienced engineer, who shall adjust the geotechnical and hydrogeological investigations as required to optimize their effectiveness in collecting useful data and decrease the cost of site investigations.</p> <p>Investigations shall include the TSF and potential borrow sources for various fill and construction materials, as necessary. Groundwater conditions shall be defined to determine underdrain requirements.</p>	<p><b>A1.1 Quduqlarni burg'ulash, sinov chuqurlari va joyida (in-situ) sinovlarni nazorat qilish</b></p> <p>Quduqlar va sinov chuqurlari Maslahatchining tajribali muhandisi tomonidan nazorat qilinishi kerak, u foydali ma'lumotlarni to'plash samaradorligini optimallashtirish va maydon qidiruv ishlari narxini pasaytirish uchun kerak bo'lganda geotexnik va gidrogeologik qidiruvlarni moslashtirishi lozim.</p> <p>Qidiruv ishlari zaruratga qarab <b>TEXNIK CHIQINDI OMBORI</b> hamda turli to'ldiruvchi va qurilish materiallari uchun potentsial karyer manbalarini o'z ichiga olishi kerak. Ostki drenaj talablarini aniqlash uchun yer osti suvlari sharoitlari belgilanishi lozim.</p>

Site investigations shall consist of a field investigation to characterize the subsurface conditions for all related facilities and structures. This task includes the following items:

- Supervision drilling exploratory boreholes;
- Identification of test pits and trenches locations;
- Supervision for geophysical investigations;
- Preparing a laboratory testing program for soil and rock samples and evaluation of results;
- Supervision for in-situ testing.

Several boreholes shall be advanced within the footprint of each structure being investigated as part of this task, typically at least 10 meters into the upper portions of the bedrock. For open pit slope design, core-oriented drillings or a televiewer may be required. This proposal assumes the Client shall provide site investigation works, including borehole drilling, in-situ testing, geophysical investigations, and laboratory test works. All drillings and test pits shall be logged in the field at the time of their advance by a qualified engineer/geologist who shall also be involved in the design of facilities.

The minimum data to be obtained from the boreholes shall be as follows:

- Time and date of start and completion of each drilling
- Reference numbers of boreholes
- Location and ground surface elevation of boreholes (surveyed by the Client)
- Depth to changes in strata
- Rock type and depths of samples
- Depth of groundwater, if encountered
- SPT values for soils
- RQD values for rock

The Consultant proposes to supplement the boreholes with a series of test pits and trenches excavated using a track hoe (to be provided by the

Maydon qidiruv ishlari barcha tegishli ob'ektlar va inshootlar uchun yer osti sharoitlarini tavsiflash maqsadida dala qidiruvlaridan iborat bo'ladi. Bu vazifa quyidagi bandlarni o'z ichiga oladi:

- Qidiruv burg'ulash quduqlarini nazorat qilish;
  - Sinov chuqurlari va xandaklar joylashuvini aniqlash;
  - Geofizik qidiruvlarni nazorat qilish;
  - Tuproq va tog' jinsi namunalari uchun laboratoriya sinov dasturini tayyorlash va natijalarni baholash;
  - Joyida (in-situ) sinovlarni nazorat qilish.
- Ushbu vazifaning bir qismi sifatida o'rganilayotgan har bir inshoot hududida bir nechta quduqlar qazilishi kerak, odatda tub jinslarning yuqori qismiga kamida 10 metr kirib boriladi. Ochiq karyer qiyaliklarini loyihalash uchun yo'naltirilgan kernli burg'ulash yoki televiewer talab qilinishi mumkin. Ushbu taklif Buyurtmachi maydonda qidiruv ishlarini, jumladan quduq burg'ulash, joyida sinovdan o'tkazish, geofizik qidiruvlar va laboratoriya sinovlarini ta'minlashini nazarda tutadi. Barcha burg'ulashlar va sinov chuqurlari qazish vaqtida dalaning o'zida inshootlarni loyihalashga ham jalb qilinadigan malakali muhandis/geolog tomonidan hujjatlashtirilishi (karotaj qilinishi) kerak.

Burg'ulash quduqlaridan olinishi kerak bo'lgan minimal ma'lumotlar quyidagilar bo'lishi lozim:

- Har bir burg'ulashning boshlanish va tugallanish vaqti hamda sanasi
  - Burg'ulash quduqlarining ma'lumot raqamlari
  - Burg'ulash quduqlarining joylashuvi va yer usti belgisi (Buyurtmachi tomonidan o'lchanadi)
  - Qatlamlar o'zgarishigacha bo'lgan chuqurlik
  - Tog' jinsi turi va namunalari olingan chuqurliklar
  - Yer osti suvlari sathining chuqurligi (agar duch kelinsa)
  - Tuproqlar uchun SPT qiymatlari
  - Tog' jinslari uchun RQD qiymatlari
- Maslahatchi quduqlarni ekskavator yordamida qazilgan bir qator sinov chuqurlari va xandaklar bilan to'ldirishni taklif qiladi (ekskavator

Client). The test pits and trenches shall allow for investigations over a broader area while minimizing the number of boring and overall cost. They shall also enable bulk samples to be collected to evaluate construction material sources and characteristics more effectively. The purpose of the test pits shall be to characterize the surficial soil material.

Several samples of soil and rock shall be collected from various depths of each borehole and test pit. If available, a soil laboratory in Uzbekistan can be used and supplemented with outside laboratories (Turkey, USA, etc.).

The site engineer shall be responsible for the following works;

- Geotechnical logging of boreholes;
- Management and recording of in-situ tests and sampling;
- Preparing laboratory test work program.

#### **A1.2 Laboratory Test Work Management**

The Consultant shall manage the test program and test configurations and maintain communications.

The laboratory tests help understand the geotechnical conditions and parameters of both the foundation and fill material. Therefore, the Consultant shall follow the laboratory studies and give necessary directions to simulate the site conditions.

In addition to core or pit samples, the Consultant shall ask to perform some tests on tailings produced by the Client (or by others) in the laboratory conditions. Except for simple soil laboratory tests like identification tests (specific gravity, Atterberg limits, sieve/hydrometer tests, etc.), large-scale seepage-induced consolidation test (SICT) may be necessary that can only be performed in the USA.

Buyurtmachi tomonidan taqdim etiladi). Sinov chuqurlari va xandaklar burg'ulashlar sonini va umumiy xarajatlarni minimallashtirgan holda kengroq hududda qidiruv ishlarini olib borish imkonini beradi. Shuningdek, ular qurilish materiallari manbalari va xususiyatlarini samaraliroq baholash uchun katta hajmli namunalarni (bulk samples) olishga imkon beradi. Sinov chuqurlaridan maqsad yer usti tuproq materialini tavsiflashdir.

Har bir quduq va sinov chuqurining turli chuqurliklaridan tuproq va tog' jinslarining bir nechta namunalari olinishi kerak. Agar mavjud bo'lsa, O'zbekistondagi tuproq laboratoriyasidan foydalanish mumkin va u xorijiy laboratoriyalar (Turkiya, AQSh va h.k.) bilan to'ldirilishi mumkin. Maydon muhandisi quyidagi ishlar uchun javobgar bo'ladi;

- Burg'ulash quduqlarining geotexnik karotaji;
- Joyida (in-situ) sinovlar va namuna olishni boshqarish va qayd etish;
- Laboratoriya sinovlari dasturini tayyorlash.

#### **A1.2 Laboratoriya sinov ishlarini boshqarish**

Maslahatchi sinov dasturi va sinov konfiguratsiyalarini boshqarishi hamda aloqani ta'minlashi kerak.

Laboratoriya sinovlari poydevor va to'ldiruvchi materialning geotexnik sharoitlari va parametrlarini tushunishga yordam beradi. Shuning uchun, Maslahatchi laboratoriya tadqiqotlarini kuzatib borishi va maydon sharoitlarini modellashtirish (simulyatsiya qilish) uchun zarur ko'rsatmalar berishi lozim.

Kern yoki chuqur namunalardan tashqari, Maslahatchi laboratoriya sharoitida Buyurtmachi (yoki boshqalar) tomonidan ishlab chiqarilgan qoldiqlar (tailings) bo'yicha ba'zi sinovlarni o'tkazishni so'raydi. Identifikatsiya sinovlari (solishtirma og'irlik, Atterberg chegaralari, elak/gidrometr sinovlari va boshqalar) kabi oddiy tuproq laboratoriya sinovlaridan tashqari, faqat AQShda amalga oshirilishi mumkin bo'lgan katta miqyosdagi sizot suvlar ta'sirida konsolidatsiya sinovi (SICT) talab qilinishi mumkin.

### **A1.3 Site-Specific Seismic Risk Analysis**

The Consultant will prepare a seismic risk analysis for all structures within the mine site, to be shared with other parties involved.

Developing a Probabilistic and Deterministic Seismic Hazard Assessment is a multi-step process described in the following sub-tasks.

#### *Seismic Source Characterization*

The Consultant shall review publicly available geotechnical, geologic, and seismic information for the site. The focus of this review shall be to characterize the Project's seismotectonic setting, including identifying late Quaternary active faults and areal source zones and their seismogenic characteristics, active crustal sources, subduction sources, and deep intraslab sources, which may or may not be relevant to the seismic hazard.

#### *Site Characterization*

This sub-task includes reviewing site geophysical evaluation reports and/or publicly available geotechnical, geologic, and seismic information. The site characterization shall assign a time-averaged shear wave velocity in the upper 30 m ( $V_{s30}$ ), the depth to shear wave velocity of at least 1.0 km/s (Z1.0), and the depth to shear wave velocity of at least 2.5 km/s (Z2.5). If site-specific information is limited, inferences on the site conditions shall be made based on experience. If additional data becomes available after completing the ground-motion evaluation, results shall be updated accordingly.

#### *Ground-Motion Characterization*

The Consultant shall use active tectonic sources and any regional or local attenuation model(s) developed for the site. The selected sets of models

### **A1.3 Maydon uchun maxsus seysmik xavf tahlili**

Maslahatchi kon maydonidagi barcha inshootlar uchun seysmik xavf tahlilini tayyorlaydi va bu tahlil jalb qilingan boshqa tomonlar bilan bo'lishiladi.

Ehtimoliy va Deterministik Seysmik Xavfni Baholashni ishlab chiqish quyidagi qism-vazifalarda ta'riflangan ko'p bosqichli jarayondir.

#### *Seysmik manbani tavsiflash*

Maslahatchi maydon bo'yicha ochiq mavjud bo'lgan geotexnik, geologik va seysmik ma'lumotlarni ko'rib chiqishi kerak. Ushbu ko'rib chiqishning asosiy maqsadi Loyihaning seysmotektonik holatini, shu jumladan kechki To'rtlamchi davr faol yoriqlari va hududiy manba zonalarini hamda ularning seysmogen xususiyatlarini, faol qobiq manbalarini, subduksiya manbalarini va chuqur plita ichidagi manbalarni (ular seysmik xavfga aloqador bo'lishi yoki bo'lmasligi mumkin) aniqlash orqali tavsiflashdan iborat bo'ladi.

#### *Maydonni tavsiflash*

Ushbu qism-vazifa maydonni geofizik baholash hisobotlarini va/yoki ochiq mavjud bo'lgan geotexnik, geologik va seysmik ma'lumotlarni ko'rib chiqishni o'z ichiga oladi. Maydon tavsifida yuqori 30 metr uchun vaqt bo'yicha o'rtacha kesishish to'lqini tezligi ( $V_{s30}$ ), kamida 1,0 km/s kesishish to'lqini tezligigacha bo'lgan chuqurlik (Z1.0) va kamida 2,5 km/s kesishish to'lqini tezligigacha bo'lgan chuqurlik (Z2.5) belgilanadi. Agar maydonga oid ma'lumotlar cheklangan bo'lsa, maydon sharoitlari bo'yicha xulosalar tajribaga asoslanib chiqariladi. Agar yer harakatini baholash tugallangandan so'ng qo'shimcha ma'lumotlar paydo bo'lsa, natijalar mos ravishda yangilanadi.

#### *Yer harakatini tavsiflash*

Maslahatchi faol tektonik manbalardan va maydon uchun ishlab chiqilgan har qanday mintaqaviy yoki mahalliy so'nish model(lar)idan foydalanishi kerak.

shall produce ground-motion intensities that reflect response spectral values at a 5% viscous damping ratio. Ground motions shall be specified at the free-field ground surface using the site characterization parameters described above (e.g., Vs30, Z1.0, and Z2.5). Near-source directivity and fling effects shall not be considered unless an active fault is identified within 10 km of the site.

#### *Deterministic Ground-Motion Response Spectra Development*

A deterministic seismic hazard analysis (DSHA) shall be performed to develop the Maximum Credible Earthquake (MCE) for the site. Peak ground acceleration (PGA) and spectral acceleration (SA) values at the 50th and 84th percentiles shall be calculated for scenario earthquakes on the active faults and for activity rates on the areal seismic source(s) characterization. The scenario earthquake resulting in the highest seismic demand shall be selected as the MCE, and ground-motion response spectra for these events shall be provided.

#### *Probabilistic Ground-Motion Response Spectra Development*

A probabilistic seismic hazard analysis (PSHA) shall be completed to develop equal hazard spectra at average return periods of 475, 975, 2450, 5000, and 10,000 years, including degradation plots at specific spectral periods for each return period. These shaking conditions would be expressed in terms of response spectral values for 5% damping and would be developed using the same source, site, and ground motion from the seismic source characterizations.

### **A1.4 Geological Hazard Assessment**

Based on the available data and visual inspection during the site visit, a geological hazard, as well as a risk assessment consisting of landslide potential, rock fall, seismic risk, and unfavorable

Tanlangan modellar to'plami 5% qovushqoq so'nish koeffitsientidagi javob spektral qiymatlarini aks ettiruvchi yer harakati intensivligini hosil qilishi lozim. Yer harakatlari yuqorida tavsiflangan maydon tavsifi parametrlari (masalan, Vs30, Z1.0 va Z2.5) yordamida erkin maydon yer yuzasida belgilanishi kerak. Agar maydondan 10 km radiusda faol yoriq aniqlanmasa, manbaga yaqin yo'naltirilganlik va siljish effektlari (fling effects) hisobga olinmaydi.

#### *Deterministik yer harakatining javob spektrlarini ishlab chiqish*

Maydon uchun Maksimal Ehtimoliy Zilzilani (MCE) ishlab chiqish maqsadida deterministik seysmik xavf tahlili (DSHA) o'tkazilishi kerak. Faol yoriqlardagi ssenariy zilzilalar va hududiy seysmik manba(lar) tavsifi bo'yicha faollik darajalari uchun 50- va 84-persentillarda yerdagi maksimal tezlanish (PGA) va spektral tezlanish (SA) qiymatlari hisoblab chiqilishi lozim. Eng yuqori seysmik talabni keltirib chiqaradigan ssenariy zilzila MCE sifatida tanlanishi va ushbu hodisalar uchun yer harakatining javob spektrlari taqdim etilishi kerak.

#### *Ehtimoliy yer harakatining javob spektrlarini ishlab chiqish*

O'rtacha qaytarilish davri 475, 975, 2450, 5000 va 10 000 yil bo'lgan teng xavf spektrlarini, shu jumladan har bir qaytarilish davri uchun ma'lum spektral davrlardagi degradatsiya grafiklarini ishlab chiqish uchun ehtimoliy seysmik xavf tahlili (PSHA) yakunlanishi kerak. Ushbu silkinish sharoitlari 5% so'nish uchun javob spektral qiymatlari orqali ifodalanadi va seysmik manba tavsiflaridagi bir xil manba, maydon va yer harakatlaridan foydalangan holda ishlab chiqiladi.

### **A1.4 Geologik xavfni baholash**

Mavjud ma'lumotlar va maydonga tashrif davomidagi vizual tekshiruv asosida geologik xavf, shuningdek TEXNIK CHIQUINDI OMBORI ning ko'chki ehtimoli, tosh qulashi, seysmik xavf va

<p>ground conditions of the the TSF shall be performed and summarized.</p> <p>The Consultant shall provide a TEM to issue geological hazard assessment studies.</p>	<p>noqulay yer sharoitlaridan iborat bo'lgan xavf baholanishi va umumlashtirilishi kerak.</p> <p>Maslahatchi geologik xavfni baholash tadqiqotlarini e'lon qilish uchun TEM taqdim etishi lozim.</p>
<p><b>A2 Preliminary Design</b></p>	<p><b>A2 Dastlabki loyihalash</b></p>
<p><b>A2.1 Data Collection, Creation, and Review of Previous Studies</b></p> <p>The Consultant shall issue a TEM to request any available data and information related to the Project area, including topographical maps, meteorological / flow measurements, conceptual layouts, available geological information and maps, borehole logs, and core box photos for any drillings, etc. Then, the Consultant shall review and evaluate all available data and discuss with the Client to identify project requirements and enhancement for further studies.</p> <p><b>A2.2 Site Visit and Reconnaissance, Kickoff Meeting</b></p> <p>The Consultant shall organize a site visit after the preliminary office studies with the Client and the project team. The purpose of this site visit is to perform site reconnaissance, evaluate the surface geological conditions, visualize the earlier studies, and better understand the project requirements. A kickoff meeting shall be held during or after the site visit. A preliminary summary of findings and recommendations shall be discussed with the Client in this meeting.</p> <p>The Consultant shall provide a follow-up TEM of the site visit to discuss the preliminary findings and to incorporate the established design criteria list and finalized structure locations for the further design stages.</p> <p><b>A2.3 Preliminary Layout Studies</b></p>	<p><b>A2.1 Ma'lumotlarni to'plash, yaratish va oldingi tadqiqotlarni ko'rib chiqish</b></p> <p>Maslahatchi Loyiha hududiga tegishli har qanday mavjud ma'lumot va axborotlarni, jumladan topografik xaritalar, meteorologik / oqim o'lchovlari, kontseptual sxemalar, mavjud geologik ma'lumotlar va xaritalar, burg'ulash quduqlari jurnallari va har qanday burg'ulashlar uchun kern qutilari rasmlari va boshqalarni so'rash uchun TEM chiqarishi kerak. So'ngra, Maslahatchi barcha mavjud ma'lumotlarni ko'rib chiqadi va baholaydi hamda loyiha talablari va keyingi tadqiqotlarni takomillashtirishni aniqlash uchun Buyurtmachi bilan muhokama qiladi.</p> <p><b>A2.2 Maydonga tashrif va razvedka, Kirish (Kickoff) uchrashuvi</b></p> <p>Maslahatchi Buyurtmachi va loyiha jamoasi bilan ofisdagi dastlabki o'rganishlardan so'ng maydonga tashrifni tashkil qilishi kerak. Ushbu tashrifdan maqsad maydon razvedkasini o'tkazish, yer usti geologik sharoitlarini baholash, avvalgi tadqiqotlarni vizuallashtirish va loyiha talablarini yaxshiroq tushunishdir.</p> <p>Tashrif davomida yoki undan keyin kirish (kickoff) uchrashuvi o'tkazilishi lozim. Ushbu uchrashuvda aniqlangan holatlar va tavsiyalarning dastlabki xulosasi Buyurtmachi bilan muhokama qilinadi. Maslahatchi dastlabki xulosalarni muhokama qilish hamda keyingi loyihalash bosqichlari uchun belgilangan loyiha mezonlari ro'yxati va inshootlarning yakuniy joylashuvini kiritish uchun maydonga tashrifning davomi sifatida TEM taqdim etishi kerak.</p> <p><b>A2.3 Dastlabki joylashuv sxemasi tadqiqotlari</b></p>

<p>The preliminary TSF layout shall be studied in accordance with the allocated location. The preliminary layout shall consist of 2D/3D string models for the Client review. This study shall be the fundamental study for the detailed design; therefore, it should be the first step of optimizations to satisfy the material balance. Additionally, this study shall define the facility footprints and shall also be a baseline for GI.</p> <p>Preliminary layout studies in raw drawing format shall be shared with the Client.</p>	<p>Dastlabki TEXNIK CHIQINDI OMBORI joylashuv sxemasi ajratilgan hududga muvofiq o'rganilishi kerak. Dastlabki sxema Buyurtmachi ko'rib chiqishi uchun 2D/3D qatorli (string) modellardan iborat bo'ladi. Ushbu tadqiqot batafsil loyihalash uchun fundamental o'rganish bo'ladi; shuning uchun materiallar balansini ta'minlash maqsadida bu optimallashtirishning birinchi qadami bo'lishi lozim. Bundan tashqari, ushbu tadqiqot ob'ektlarning egallaydigan maydonlarini (footprints) belgilaydi va geotexnik qidiruv (GI) uchun asos bo'ladi.</p> <p>Xomaki chizma formatidagi dastlabki joylashuv tadqiqotlari Buyurtmachi bilan bo'lishiladi.</p>
<p><b>A3 Tailings Storage Facility</b></p> <p><b>A3.1 Design Criteria Memo</b></p> <p>A comprehensive design criteria memo shall be prepared after the completion of preliminary design works and geotechnical investigations and submitted by the Consultant as a separate TEM.</p> <p>In preparing this TEM, the Consultant shall work with the process design consultant to obtain any essential heap material properties and metallurgical leaching requirements.</p> <p>This TEM, which is subject to be revised if deemed necessary during the lifetime of the design, shall include all selected parameters and assumptions regarding the design requirements and the site-specific conditions. On the other hand, any changes after the final issue of this memo may result in a future scope change request, depending on the effect of the shift in the design.</p> <p><b>A3.2 Site Grading and Impoundment Design</b></p> <p>Since the impoundment of TSF shall be lined, well-described grading of the site is necessary. For this purpose, a 3-D grading and cut-fill model shall be prepared. Site grading and impoundment design shall consist of the following items.</p>	<p><b>A3 Qoldiqlarni saqlash inshooti</b></p> <p><b>A3.1 Loyihalash mezonlari memorandumumi</b></p> <p>Dastlabki loyihalash ishlari va geotexnik qidiruvlar yakunlangandan so'ng, keng qamrovli loyihalash mezonlari memorandumumi tayyorlanishi va Maslahatchi tomonidan alohida TEM sifatida taqdim etilishi kerak.</p> <p>Ushbu TEM ni tayyorlashda Maslahatchi uyum materialining har qanday muhim xususiyatlari va metallurgik tanlab eritish (ishqorlash) talablarini olish uchun texnologik loyihalashtirish maslahatchisi bilan hamkorlik qilishi lozim.</p> <p>Loyihalash davomida zarur deb topilsa qayta ko'rib chiqilishi mumkin bo'lgan ushbu TEM o'z ichiga loyiha talablari va maydonga xos sharoitlarga oid barcha tanlangan parametrlar va taxminlarni qamrab olishi kerak. Boshqa tomondan, ushbu memorandumning yakuniy nashridan keyingi har qanday o'zgarishlar, ularning loyihadagi o'zgarishlarga ta'siriga qarab, kelajakda ish ko'lamini o'zgartirish bo'yicha so'rovga olib kelishi mumkin.</p> <p><b>A3.2 Maydonni tekislash va ombor dizayni</b></p> <p>TEXNIK CHIQINDI OMBORI ombori qoplama (liner) bilan qoplanishi sababli, maydonni yaxshi tavsiflangan holda tekislash (grading) zarur. Shu maqsadda, maydonni tekislash va kesish-to'ldirish (cut-fill) uchun 3D model tayyorlanishi kerak. Maydonni tekislash va ombor dizayni quyidagi bandlardan iborat bo'ladi.</p>

### *3D solid site grading model*

Project slopes shall be arranged via 3-D software so that the volume of earth movement shall be minimized (or optimized regarding mine mass balance). Furthermore, the Consultant shall take into account the multi-phased construction of TSF.

### *Benching, stripping, and excavation design*

Impoundment side slopes should be stable and satisfy stability conditions. Moreover, the site topography is highly steep, and the consultant shall consider the construction difficulties while designing the impoundment excavation and fill plan.

### *Impoundment road design*

Service roads for the operation and maintenance (and access roads during construction) need to be considered and designed by the Consultant, considering the topography of TSF.

### *Excavation stability analysis and design (kinematic / limit equilibrium)*

Stability condition is the most important issue for safe and reliable TSF operation and construction. The Consultant shall decide on the most suitable analysis method for stability. Multiple stability analyses may be needed to better understand the failure mechanism of the slopes since the area is mostly composed of fractured volcanic rock alternation with weathered products of bedrock. For this purpose, the Consultant may focus on both wedge/planar rock failure and circular failure.

### *Impoundment freeboard calculation*

It is assumed that it is not allowed to discharge from the TSF. For this reason, TSF should be

### *3D qattiq jinsli maydonni tekislash modeli*

Yer ishlari hajmini minimallashtirish (yoki kon massasi balansiga ko'ra optimallashtirish) uchun loyiha qiyaliklari 3D dasturiy ta'minot orqali tartibga solinishi kerak. Bundan tashqari, Maslahatchi TEXNIK CHIQINDI OMBORI ni ko'p bosqichli qurilishini hisobga olishi lozim.

### *Pog'onalash, qatlamni ochish va qazish dizayni*

Omborning yon qiyaliklari barqaror bo'lishi va barqarorlik shartlariga javob berishi kerak. Qolaversa, maydon topografiyasi juda tik, va maslahatchi omborni qazish va to'ldirish rejasini ishlab chiqishda qurilish qiyinchiliklarini hisobga olishi lozim.

### *Ombor yo'llari dizayni*

Foydalanish va texnik xizmat ko'rsatish uchun xizmat yo'llari (va qurilish davridagi kirish yo'llari) TEXNIK CHIQINDI OMBORI topografiyasini hisobga olgan holda Maslahatchi tomonidan ko'rib chiqilishi va loyihalashtirilishi kerak.

### *Qazilma barqarorligini tahlil qilish va loyihalash (kinematik / limit muvozanat)*

Barqarorlik holati TEXNIK CHIQINDI OMBORI ni xavfsiz va ishonchli ishlatish hamda qurish uchun eng muhim masaladir. Maslahatchi barqarorlik uchun eng mos tahlil usulini hal qilishi kerak. Qiyaliklarning qulash mexanizmini yaxshiroq tushunish uchun bir nechta barqarorlik tahlillari kerak bo'lishi mumkin, chunki hudud asosan nuragan tub jins mahsulotlari bilan almashinib turadigan yoriqli vulqon jinslaridan iborat. Shu maqsadda, Maslahatchi pona/tekislikdagi (wedge/planar) tog' jinslari qulashiga ham, sirkulyar (aylanma) qulashga ham e'tibor qaratishi mumkin.

### *Omborning erkin balandligi (freeboard) hisobi*

Texnik chiqindi omboridan suv oqizishga ruxsat etilmaydi deb faraz qilinadi. Shu sababli, texnik

<p>designed as a zero-discharge principle. Therefore, freeboard shall be calculated as safely stored flows determined by hydrological analysis.</p> <p><b>A3.3 Embankment Design</b></p> <p><i>Dam Classification and Design Standard</i></p> <p>TSF design shall be made as a design for closure. The Consultant shall classify the TSF according to international (ICOLD, CDA, ANCOLD) standards;</p> <p><i>Stripping and foundation excavation design</i></p> <p>Foundation design, stripping depths, and excavation geometry shall be well-defined in the design drawing.</p> <p><i>Zoning and filter design</i></p> <p><i>Static/pseudo-static slope stability analysis (2D / 3D)</i></p> <p>The Consultant shall use engineering software (Rocscience, Geo5, GeoStudio, Midas GTS, Plaxis, etc.) in order to analyze the stability of the embankment. Soil-structure relation, foundation, and fill material shear strength parameters shall be defined for the stability model.</p> <p><i>Static/pseudo-static stress/deformation analysis (2D / 3D)</i></p> <p>Settlement of the embankment foundation soils or fills overlying bedrock shall be predicted using 2-3 dimensional stress-deformation modeling based on geotechnical information gathered at the site. Total/ differential settlement on the liner system for liner integrity shall be determined by using related software.</p>	<p>chiqindi ombori nol tashlama tamoyili (zero-discharge) asosida loyihalashtirilishi kerak. Shunday qilib, erkin balandlik gidrologik tahlil bilan aniqlangan xavfsiz saqlanadigan oqimlar sifatida hisoblab chiqilishi lozim.</p> <p><b>A3.3 To'g'on/Ko'tarma dizayni</b></p> <p><i>To'g'on tasnifi va loyihalash standarti</i></p> <p>Texnik chiqindi ombori dizayni kelajakda yopishni hisobga olgan holda tayyorlanishi kerak. Maslahatchi texnik chiqindi omborini xalqaro (ICOLD, CDA, ANCOLD) standartlarga muvofiq tasniflashi lozim;</p> <p><i>Qatlamni ochish va poydevor qazish dizayni</i></p> <p>Poydevor dizayni, qatlamni ochish chuqurliklari va qazish geometriyasi loyiha chizmalarida yaxshi belgilangan bo'lishi kerak.</p> <p><i>Zonalashtirish va filtr dizayni</i></p> <p><i>Statik/psevdo-statik qiyalik barqarorligi tahlili (2D / 3D)</i></p> <p>Maslahatchi to'g'on barqarorligini tahlil qilish uchun muhandislik dasturlaridan (Rocscience, Geo5, GeoStudio, Midas GTS, Plaxis va h.k.) foydalanishi lozim. Barqarorlik modeli uchun tuproq-inshoot munosabati, poydevor va to'ldiruvchi materialning siljish mustahkamligi parametrlari belgilanishi kerak.</p> <p><i>Statik/psevdo-statik kuchlanish/deformatsiya tahlili (2D / 3D)</i></p> <p>Tub jinsda yotgan to'g'on poydevori tuproqlari yoki to'ldirmalarning cho'kishi maydonda to'plangan geotexnik ma'lumotlarga asoslangan 2-3 o'lchovli kuchlanish-deformatsiya modellashtirishi yordamida bashorat qilinishi kerak. Qoplama (liner) butunligini ta'minlash uchun qoplama tizimidagi umumiy/differentsial cho'kish tegishli dasturiy ta'minot yordamida aniqlanishi lozim.</p>
--	---

<p><i>Instrumentation design</i></p> <p>Instrumentation for the TSF shall be designed by the Consultant. Depths, quantities, and specifications of the inclinometer, piezometer, etc., shall be defined in the design.</p> <p><b>A3.4 Surface Water Management System Design</b></p> <p>Surface water management of TSF shall include but is not limited to the following structures.</p> <p><i>Sediment trap structure(s) design</i>  <i>Perimeter channel(s) design</i>  <i>Chute and energy dissipator design</i></p> <p>The hydraulic calculation and sizing of structures and channels shall be included in a TEM named surface water management plan. The details of the structures shall be provided in the design drawings.</p> <p><b>A3.5 Underdrain System Design</b></p> <p>All of the components of the underdrain system (trenches, collection pipes, sump, etc.) shall be designed at this stage.</p> <p><i>Underdrain Piping Design</i></p> <p>The TSF area underdrains shall collect and route natural seepage flows and percolated waters beneath the lined area to a downstream underdrain sump for monitoring water quality.</p> <p><i>Underdrain Sump Design</i></p> <p>Collected water by an underdrain piping system shall be diverted to a downstream underdrain sump for monitoring water quality. The system shall allow the monitored underdrain flows to</p>	<p><i>Nazorat-o'lchov asboblari dizayni</i></p> <p>Texnik Chiqindi Ombori uchun nazorat-o'lchov asboblari Maslahatchi tomonidan loyihalashtirilishi kerak. Loyihada inklinometr, pezometr va hokazolarning chuqurligi, miqdori va texnik xususiyatlari belgilanishi lozim.</p> <p><b>A3.4 Yer usti suvlarini boshqarish tizimi dizayni</b></p> <p>Texnik Chiqindi Omborida yer usti suvlarini boshqarish quyidagi inshootlarni o'z ichiga oladi, lekin ular bilan cheklanmaydi.</p> <p><i>Cho'kindi tutqich inshoot(lar)i dizayni</i>  <i>Perimetr bo'ylab kanal(lar) dizayni</i>  <i>Suv tashlama (nov) va energiya so'ndirgich dizayni</i></p> <p>Inshootlar va kanallarning gidravlik hisob-kitobi va o'lchamlari yer usti suvlarini boshqarish rejasi deb nomlangan TEM ga kiritilishi kerak. Inshootlarning detallari loyiha chizmalarida taqdim etiladi.</p> <p><b>A3.5 Ostki drenaj tizimi dizayni</b></p> <p>Ostki drenaj tizimining barcha tarkibiy qismlari (xandaklar, yig'uvchi quvurlar, suv yig'ish chuquri/zumpfi va h.k.) ushbu bosqichda loyihalashtirilishi kerak.</p> <p><i>Ostki drenaj quvurlari dizayni</i></p> <p>Texnik Chiqindi Ombori hududidagi ostki drenajlar tabiiy sizot suvlarini va qoplamali maydon ostidan o'tgan suvlarni yig'ishi va suv sifatini nazorat qilish uchun quyi oqimdagi ostki drenaj zumpfiga yo'naltirishi kerak.</p> <p><i>Ostki drenaj zumpfi (suv yig'uvchisi) dizayni</i></p> <p>Ostki drenaj quvurlar tizimi orqali yig'ilgan suv sifatini nazorat qilish uchun quyi oqimdagi ostki drenaj zumpfiga yo'naltiriladi. Tizim, agar suv sifati qabul qilinadigan darajada bo'lsa, nazorat qilinadigan ostki drenaj oqimlarining quyi oqimdagi</p>
---	---

flow by gravity to the downstream natural drainage if water quality is acceptable.

### **A3.6 Liner System Design**

In order to maintain the impermeability of the impoundment and prevent any leakage from TSF, a liner system shall be designed according to applicable regulations and international standards.

#### *Impoundment stress/deformation analysis for liner system (2D / 3D)*

Stress-deformation analysis shall be made to determine the maximum stress on the liner to specify and propose suitable geosynthetic material.

#### *Composite liner system design*

Based on industry standards, the liner system should include a minimum 2-mm thick geomembrane and 0.50-m thick (soil) clay liner with a maximum permeability of  $1 \times 10^{-9}$  m/s, or equivalent. In some cases, acceptable soil material cannot be found in the vicinity of the project area. Therefore, a composite liner system needs to be designed.

#### *Anchor design*

Anchor trenches shall be geometrically designed, and backfill specifications and construction methods shall be explained.

### **A3.7 Overdrain System Design**

An overdrain system shall be designed to reduce hydraulic pressure on the liner system and maintain bidirectional consolidation of slurry.

#### *Overdrain collection system design*

The collection system includes collection pipes, granular material, and other related structures shall be defined.

tabiiy drenajga o'z og'irligi bilan oqib tushishiga imkon berishi kerak.

### **A3.6 Qoplama (Liner) tizimi dizayni**

Omborning suv o'tkazmasligini ta'minlash va Texnik Chiqindi Omboridan har qanday oqishning oldini olish maqsadida, amaldagi qoidalar va xalqaro standartlarga muvofiq qoplama tizimi loyihalashtirilishi kerak.

#### *Qoplama tizimi uchun ombordagi kuchlanish/deformatsiya tahlili (2D / 3D)*

Tegishli geosintetik materialni belgilash va taklif qilish maqsadida qoplamadagi maksimal kuchlanishni aniqlash uchun kuchlanish-deformatsiya tahlili o'tkazilishi lozim.

#### *Kompozit qoplama tizimi dizayni*

Sanoat standartlariga asoslanib, qoplama tizimi kamida 2 mm qalinlikdagi geomembrana va maksimal o'tkazuvchanligi  $1 \times 10^{-9}$  m/s bo'lgan 0,50 m qalinlikdagi (tuproqli) gil qoplamasini yoki uning ekvivalentini o'z ichiga olishi kerak. Ba'zi hollarda loyiha hududi atrofida maqbul tuproq materiali topilmasligi mumkin. Shuning uchun, kompozit qoplama tizimini loyihalashtirish kerak bo'ladi.

#### *Anker dizayni*

Anker xandaklari (trancheyalari) geometrik jihatdan loyihalashtirilishi, qayta ko'mish spetsifikatsiyalari va qurilish usullari tushuntirilishi kerak.

### **A3.7 Ustki drenaj tizimi dizayni**

Qoplama tizimidagi gidravlik bosimni kamaytirish va bo'tqaning (slurry) ikki yo'nalishli konsolidatsiyasini ta'minlash uchun ustki drenaj tizimi loyihalashtirilishi kerak.

#### *Ustki drenaj yig'ish tizimi dizayni*

Yig'ish tizimiga yig'uvchi quvurlar, donador materiallar va boshqa tegishli inshootlar kiradi va ular belgilanishi kerak.

#### *Overdrain sump design*

The location and size of the sump pit/pond shall be identified in the design

#### *Overdrain water reclaim system design*

Pump selection, water inlet and outlet locations, and reclaim system shall be presented in the design.

### **A3.8 Water Balance Calculation**

A detailed water balance calculation (WBC) shall be performed, and the calculation parameters' assumptions need to be described. Inflows and outflows shall be calculated in parallel with the mine operation schedule. WBC shall include, but not be limited to, water surface, tailing storage volume, supernatant water volume, total volume, maximum water depth, makeup requirement, discharge requirement, precipitation, evaporation, beach angle, area of beach surface, etc.

### **A3.9 Conceptual Closure and Reclamation Plan**

Based on industrial practice, the closure design must be prepared just before the closure of TSF. At this stage, a conceptual closure plan shall be provided.

Consultant shall issue a report for the closure plan.

### **A3.10 Operation, Maintenance, and Surveillance (OMS) Plan**

An OMS Plan shall be developed consistent with CDA/MAC guidelines that provide operational best management practices and protocols required to operate the TSF safely. The plan shall be defined in an OMS Manual and shall include, among other things:

#### *Ustki drenaj zumpfi dizayni*

Loyiha doirasida suv yig'ish chuquri/hovuzining joylashuvi va o'lchami aniqlanishi lozim.

#### *Ustki drenaj suvlarini qaytarish tizimi dizayni*

Nasos tanlash, suv kirish va chiqish joylari hamda qaytarish (reclaim) tizimi loyihada taqdim etilishi kerak.

### **A3.8 Suv balansi hisobi**

Suv balansining batafsil hisobi (WBC) amalga oshirilishi va hisoblash parametrlarining shartlari tasvirlanishi kerak. Kiruvchi va chiquvchi oqimlar konda ishlash jadvaliga muvofiq parallel ravishda hisoblanishi lozim. WBC suv yuzasi, qoldiqlarni saqlash hajmi, cho'kindi ustidagi suv hajmi, umumiy hajm, suvning maksimal chuqurligi, qo'shimcha suv talabi, tashlama talabi, yog'ingarchilik, bug'lanish, qirg'oq burchagi (beach angle), qirg'oq yuzasi maydoni va boshqalarni o'z ichiga oladi, lekin ular bilan cheklanmaydi.

### **A3.9 Kontseptual yopish va rekultivatsiya rejasi**

Sanoat amaliyotiga asoslanib, yopish dizayni Texnik Chiqindi Ombori yopilishidan sal oldin tayyorlanishi kerak. Ushbu bosqichda kontseptual yopish rejasi taqdim etilishi lozim.

Maslahatchi yopish rejasi bo'yicha hisobot chiqaradi.

### **A3.10 Foydalanish, texnik xizmat ko'rsatish va kuzatuv (OMS) rejasi**

Texnik Chiqindi Omboridan xavfsiz foydalanish uchun zarur bo'lgan ilg'or boshqaruv amaliyotlari va protokollarini taqdim etuvchi CDA/MAC ko'rsatmalariga muvofiq OMS Rejasi ishlab chiqilishi kerak. Reja OMS Qo'llanmasida belgilanadi va boshqa narsalar qatorida quyidagilarni o'z ichiga oladi:

- Operation Team responsibilities;
- Instructions and forms for documenting monitoring instrumentation data collected;
- Monitoring instrumentation "Trigger" response levels and reporting protocols;
- Tailings and water management operational protocols;
- Care and maintenance requirements;
- Dam Inspection schedules and forms;
- Examples of unusual observations that could lead to upset conditions;
- Reporting instructions and protocols; and Engineer of Record (EoR) responsibilities;

The OMS Plan shall be prepared as a stand-alone report customized and specific to this TSF that is accessible and functional for practical use by the Operations Team.

### **A3.11 Geotechnical and Borrow Source Investigation Reports**

Upon the conclusion of the subsurface investigations, separate Geotechnical and Borrow Source Investigation Reports shall be issued to provide the findings of the site investigations and estimate engineering parameters for the design of the TSF.

This report shall include, at a minimum:

- Logs, photos, and maps for each borehole, test pit, and trench;
- Regional and local geology;
- Soil and rock laboratory test results;
- Results of in-situ tests;
- Engineering assessment and recommendations;
- Results of the borrow source investigation, including recommended material use.

- Operatsion jamoa mas'uliyatlari;
- To'plangan nazorat-o'lchov asboblari ma'lumotlarini hujjatlashtirish bo'yicha ko'rsatmalar va shakllar;
- Nazorat-o'lchov asboblarining "Ishga tushirish" (Trigger) reaksiya darajalari va hisobot protokollari;
- Qoldiqlar va suvni boshqarish bo'yicha operatsion protokollar;
- Ehtiyotkorlik va texnik xizmat ko'rsatish talablari;
- To'g'onni tekshirish jadvallari va shakllari;
- Avariya holatlariga olib kelishi mumkin bo'lgan g'ayrioddiy kuzatuvlarga misollar;
- Hisobot berish bo'yicha ko'rsatmalar va protokollar va Mas'ul muhandis (EoR) majburiyatlari;

OMS Rejasi ushbu Texnik Chiqindi Ombori uchun moslashtirilgan va maxsus, Operatsion jamoa tomonidan amaliy foydalanish uchun ochiq va qulay bo'lgan alohida hisobot sifatida tayyorlanishi kerak.

### **A3.11 Geotexnik va karyer manbalarini qidirish hisobotlari**

Yer osti qidiruv ishlari yakunlangandan so'ng, maydon qidiruv natijalarini taqdim etish va Texnik Chiqindi Ombori dizayni uchun muhandislik parametrlarini baholash maqsadida alohida Geotexnik va Karyer manbalarini qidirish hisobotlari chiqarilishi kerak.

Ushbu hisobot kamida quyidagilarni o'z ichiga olishi lozim:

- Har bir quduq, sinov chuquri va xandak uchun jurnallar (loglar), rasmlar va xaritalar;
- Mintaqaviy va mahalliy geologiya;
- Tuproq va tog' jinslarini laboratoriya sinovlari natijalari;
- Joyida (in-situ) sinovlar natijalari;
- Muhandislik baholashlari va tavsiyalar;
- Karyer manbalarini qidirish natijalari, shu jumladan materialdan tavsiya etilgan foydalanish maqsadlari.

The final version of the report shall include geotechnical plans and sections of the proposed structures.

### **A3.12 Design Report**

The Consultant shall submit a Design Report, including all data, calculations, analysis, and outputs.

### **A3.13 IFC Drawings**

The issued for construction (IFC) drawings shall be created with AutoCAD and Bentley PowerCivil/OpenRoads software and can incorporate drawing templates, logos, and drawing numbering system, as preferred by the Client. The construction-level drawings are envisioned to include drawings with scales and units in the metric SI system for the following major topics:

- Project Location
- Legends, Fill Materials, Notes, and Drawing List
- General View of Project and Capacity Curve
- Geological Plan and Sections
- General Layout
- Plan Views
- General Layout of Excavation
- Excavation Plans
- Sections and Details
- Instrumentation Plan and Details
- Perimeter Channel & Perimeter Road Plans And Profiles
- Perimeter Channel & Perimeter Road Cross Sections
- Perimeter Channel & Perimeter Road Details
- Liner System and Details
- Underdrain System Plan, Sections, and Details
- Overdrain System Plan, Sections and Details
- Closure System Plan, Sections, and Details

Hisobotning yakuniy versiyasi taklif etilayotgan inshootlarning geotexnik rejalari va kesimlarini o'z ichiga olishi kerak.

### **A3.12 Loyiha hisoboti**

Maslahatchi barcha ma'lumotlar, hisob-kitoblar, tahlillar va natijalarni o'z ichiga olgan Loyiha hisobotini taqdim etishi kerak.

### **A3.13 Qurilish uchun berilgan (IFC) chizmalar**

Qurilish uchun berilgan (IFC) chizmalar AutoCAD va Bentley PowerCivil/OpenRoads dasturlarida yaratilishi kerak va Buyurtmachi xohishiga ko'ra chizma shablonlari, logotiplar va chizmalarni raqamlash tizimini o'z ichiga olishi mumkin. Qurilish darajasidagi chizmalar quyidagi asosiy mavzular bo'yicha metrik SI tizimidagi masshtablar va o'lchov birliklarini qamrab olishi ko'zda tutilgan:

- Loyiha joylashuvi
- Shartli belgilar, to'ldiruvchi materiallar, eslatmalar va chizmalar ro'yxati
- Loyihaning umumiy ko'rinishi va sig'im egri chizig'i
- Geologik reja va kesimlar
- Umumiy joylashuv sxemasi
- Reja ko'rinishlari
- Qazishning umumiy sxemasi
- Qazish rejalari
- Kesimlar va detallar
- Nazorat-o'lchov asboblari rejasi va detallari
- Perimetr kanali va perimetr yo'llarining rejalari va profillari
- Perimetr kanali va perimetr yo'llarining ko'ndalang kesimlari
- Perimetr kanali va perimetr yo'llarining detallari
- Qoplama tizimi va detallari
- Ostki drenaj tizimi rejasi, kesimlari va detallari
- Ustki drenaj tizimi rejasi, kesimlari va detallari
- Yopish tizimi rejasi, kesimlari va detallari

<b>A4 Construction Bidding Documents</b>	<b>A4 Qurilish bo'yicha tender hujjatlari</b>
<p data-bbox="212 327 608 360"><b>A4.1 Technical Specifications</b></p> <p data-bbox="212 396 831 752">The technical specifications shall include borrow development, earthwork excavation and fill placement, external-internal berms, diversion channels, pipes and pumps, geosynthetics, clay, overdrain underdrain, drainpipe installation, concrete, and reinforcement work requirements. Technical specifications shall present the construction components and technical specifications and address Construction Quality Assurance (CQA) procedures for the Project.</p> <p data-bbox="212 788 842 929">Construction specifications shall be developed for those components designed/specified by the Consultant. It is anticipated that the specifications package shall follow the categories listed below.</p> <ul data-bbox="212 965 746 1854" style="list-style-type: none"> <li>• Summary of work</li> <li>• Mobilization</li> <li>• Field engineering</li> <li>• Reference standards and regulations</li> <li>• Submittals</li> <li>• Quality Assurance/Quality Control</li> <li>• Materials and equipment</li> <li>• Clearing and grubbing</li> <li>• Temporary facilities</li> <li>• Project access roads</li> <li>• Borrow sources</li> <li>• Foundation dewatering</li> <li>• Foundation preparation and treatment</li> <li>• General excavation, placement, and compaction</li> <li>• Soil materials</li> <li>• Aggregate materials</li> <li>• Riprap</li> <li>• Geosynthetics</li> <li>• Piping</li> <li>• Survey monuments</li> <li>• Instrumentation</li> <li>• Cast-in-place concrete</li> <li>• Reinforcement</li> <li>• Fencing</li> </ul>	<p data-bbox="874 327 1278 360"><b>A4.1 Texnik spetsifikatsiyalar</b></p> <p data-bbox="874 396 1544 752">Texnik spetsifikatsiyalar o'z ichiga karyerni o'zlashtirish, yer ishlarini qazish va to'ldirish, tashqi-ichki bermalar, burish kanallari, quvurlar va nasoslar, geosintetikalar, gil, ustki va ostki drenaj, drenaj quvurlarini o'rnatish, beton va armaturalash ishlari talablarini qamrab olishi kerak. Texnik spetsifikatsiyalar qurilish komponentlari va texnik xususiyatlarni taqdim etishi hamda Loyiha uchun Qurilish sifatini kafolatlash (CQA) tartib-qoidalarini o'z ichiga olishi lozim.</p> <p data-bbox="874 788 1525 929">Qurilish spetsifikatsiyalari Maslahatchi tomonidan loyihalashtirilgan/belgilangan komponentlar uchun ishlab chiqiladi. Spetsifikatsiyalar to'plami quyida keltirilgan toifalarga rioya qilishi kutilmoqda.</p> <ul data-bbox="922 965 1509 1787" style="list-style-type: none"> <li>• Ishlarning qisqacha mazmuni</li> <li>• Safarbarlik (Mobilizatsiya)</li> <li>• Dala muhandisligi</li> <li>• Malumot standartlari va qoidalari</li> <li>• Taqdim etiladigan hujjatlar</li> <li>• Sifat kafolati/Sifat nazorati</li> <li>• Materiallar va uskunalar</li> <li>• Tozalash va ildizlarni qo'porish</li> <li>• Vaqtinchalik inshootlar</li> <li>• Loyiha kirish yo'llari</li> <li>• Karyer manbalari</li> <li>• Poydevordan suvni qochirish (dewatering)</li> <li>• Poydevorni tayyorlash va ishlov berish</li> <li>• Umumiy qazish, joylashtirish va zichlash</li> <li>• Tuproq materiallari</li> <li>• Agregat materiallari</li> <li>• Tosh qoplama (Riprap)</li> <li>• Geosintetikalar</li> <li>• Quvurlarni yotqizish</li> <li>• Geodezik belgilar (monumentlar)</li> <li>• Nazorat-o'lchov asboblari</li> <li>• Quyma beton (Monolit beton)</li> <li>• Armaturalash To'siqlar (Fencing)</li> </ul>

<p><b>A4.2 Bill of Quantities</b></p> <p>The Consultant shall use 3-D models to obtain an accurate bill of quantities.</p> <p><b>A4.3 Unit Price Definitions</b></p> <p>The Consultant shall prepare a document to identify and describe construction unit prices required for the cost estimate calculations and bidding.</p> <p><b>A4.4 Cost Estimate Calculations</b></p> <p>The Client's supply chain department shall use the Consultant's unit price definitions and quantities to obtain unit prices from the market. Then, the Consultant shall evaluate the collected prices and create a unit price list.</p> <p>After unit prices are estimated, the Consultant shall prepare a cost estimate calculation that can be used for all construction items (TSF, WDS, facility area earthworks, roads, etc.)</p>	<p><b>A4.2 Ish hajmlari qaydnomasi (BoQ)</b></p> <p>Maslahatchi aniq ish hajmlari qaydnomasini olish uchun 3D modellardan foydalanishi kerak.</p> <p><b>A4.3 Birlik narx ta'riflari</b></p> <p>Maslahatchi xarajatlar smetasini hisoblash va tender uchun talab qilinadigan qurilish birlik narxlarini aniqlash va tavsiflash uchun hujjat tayyorlashi lozim.</p> <p><b>A4.4 Xarajat smetasi hisob-kitoblari</b></p> <p>Buyurtmachining ta'minot zanjiri bo'limi bozordan birlik narxlarni olish uchun Maslahatchining birlik narx ta'riflari va miqdorlaridan foydalanadi. So'ngra, Maslahatchi yig'ilgan narxlarni baholaydi va birlik narxlar ro'yxatini yaratadi.</p> <p>Birlik narxlar hisoblangandan so'ng, Maslahatchi barcha qurilish ob'ektlari (Texnik Chiqindi Ombori, chiqindilarni saqlash joyi(ag'darma), inshoot maydonidagi yer ishlari, yo'llar va h.k.) uchun ishlatilishi mumkin bo'lgan xarajat smetasi hisobini tayyorlaydi.</p>
<p><b>A5 Additional Works</b></p>	<p><b>A5 Qo'shimcha ishlar</b></p>
<p><b>A5.1 Project Management</b></p> <p>Throughout the execution of the work, the Consultant shall facilitate as-needed physical or teleconference meetings with the overall project team to discuss technical issues and any critical observations that could impact proceedings.</p> <p>The project management shall include appropriate periodic e-mail correspondence updates on work progress. In addition to a kickoff meeting planned during the site visit, separate meetings shall be conducted as necessary at substantial completion</p>	<p><b>A5.1 Loyiha boshqaruvi</b></p> <p>Ishni bajarish davomida Maslahatchi texnik masalalarni va jarayonga ta'sir qilishi mumkin bo'lgan har qanday muhim kuzatuvlarni muhokama qilish uchun butun loyiha jamoasi bilan ehtiyojga qarab jismoniy yoki telekonferensiya uchrashuvlarini tashkil qilishi kerak.</p> <p>Loyiha boshqaruvi ish jarayoni bo'yicha elektron pochta orqali davriy tegishli yangilanishlarni o'z ichiga oladi. Maydonga tashrif davomida rejalashtirilgan kirish (kickoff) uchrashuviga qo'shimcha ravishda, hujjatlarni MMG izohlari bilan yakunlashdan oldin, qoralama hujjatlar sezilarli</p>

of the draft documents before finalizing the documents with MMG's comments.

The Consultant shall also issue MoM items related to the designs in her responsibility.

#### **A5.4 Document Preparation for Local Authority Approval**

The Consultant shall assist a local company provided by the Client for localization of the documents to get approval from local authorities.

#### **2.4 Optional Emergency Preparedness and Response (EPR) Plan**

Upon the request of the Client, an EPR Plan that is consistent with CDA/MAC Guidelines specific to the TSF can be prepared. The ERP's purpose is to provide specific response protocols in the event of an unanticipated irregular event or observations that could indicate imminent dam failure. "imminent" is defined as "a circumstance that, if left unattended, has the potential to evolve into an upset condition or dam failure." Examples of these types of instances are:

- Seismic events;
- Extreme rainfall or flood events;
- Liner rupture;
- Unusual seepage ("piping");
- Slope failures or slumps;
- Landslides or other geologic hazards;
- Sinkholes or tailings liquefaction in the impoundment, etc.

The following analyses and studies are compulsory for compiling the EPR Plan:

darajada yakunlanganda kerak bo'lganda alohida uchrashuvlar o'tkazilishi lozim.

Maslahatchi shuningdek, o'z javobgarligidagi loyihalarga tegishli MoM (Uchrashuv bayonnomasi) bandlarini chiqarishi kerak.

#### **A5.4 Mahalliy organlar tasdig'i uchun hujjatlar tayyorlash**

Maslahatchi mahalliy hokimiyat organlaridan ruxsat olish maqsadida hujjatlarni mahalliyashtirish uchun Buyurtmachi tomonidan taqdim etilgan mahalliy kompaniyaga yordam berishi kerak.

#### **2.4 Ixtiyoriy Favqulodda vaziyatlarga tayyorgarlik va harakat qilish (EPR) rejasi**

Buyurtmachining talabiga ko'ra, Texnik Chiqindi Ombori uchun xos bo'lgan CDA/MAC ko'rsatmalariga muvofiq EPR rejasi tayyorlanishi mumkin. ERP ning maqsadi - kutilmagan favqulodda hodisa yoki to'g'onning muqarrar qulashini ko'rsatishi mumkin bo'lgan kuzatuvlar sodir bo'lganda o'ziga xos harakat protokollarini taqdim etish. "Muqarrar" (imminent) tushunchasi "agar e'tiborsiz qoldirilsa, avariya holatiga yoki to'g'on qulashiga aylanish imkoniyatiga ega bo'lgan holat" deb ta'riflanadi. Bunday hodisalarga quyidagilar misol bo'la oladi:

- Seysmik hodisalar;
- Ekstremal yog'ingarchilik yoki suv toshqini hodisalari;
- Qoplamaning yorilishi (Liner rupture);
- G'ayrioddiy sizot suvlar oqimi ("piping");
- Qiyalikning qulashi yoki cho'kishi;
- Ko'chkilar yoki boshqa geologik xavflar;
- Ombordagi o'pirilishlar yoki qoldiqlarning suyulishi (liquefaction) va boshqalar.

Favqulodda vaziyatlarga tayyorgarlik ko'rish va chora ko'rish (EPR) rejasini tuzish uchun quyidagi tahlil va tadqiqotlarni o'tkazish majburiydir:

<ul style="list-style-type: none"><li>• Dam break (breach) analysis;</li><li>• Dynamic response analysis of embankment;</li><li>• Transient seepage analysis (for liner rupture scenario);</li><li>• Investigation of downstream effects;</li><li>• Facilitated risk assessment.</li></ul>	<ul style="list-style-type: none"><li>• To'g'onning o'pirilishi (yemirilishi) tahlili;</li><li>• Ko'tarmaning (dambaning) dinamik reaksiyasi tahlili;</li><li>• Nostatsionar sizib o'tish tahlili (qoplamaning yorilishi ssenariysi uchun);</li><li>• Quyi oqimdagi ta'sirlarni tadqiq qilish;</li><li>• Muvofiqlashtirilgan xavf-xatarlarni baholash.</li></ul>
--	--

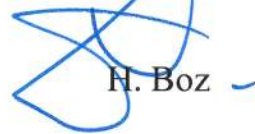
**Quyidagilar tomonidan ishlab chiqildi va kelishildi / Developed and agreed by:**

Loyiha Ofisi Rahbari  
Head of the Project Office

Konchilik bo'limi boshlig'i  
Head of mining department

Qurilish bolimi boshlig'i  
Head of the Construction Department

Loyiha Ofisi Rahbari o'rinbosari  
Deputy to the Head of the Project Office

  
H. Boz

F. Kasa

O. Yilmaz

J. Mardonov