

Semi-annual Environment & Social Monitoring Report (July to December 2015)

Environmental and Social Performance Report
March 2016

GEO: Adjaristsqali Hydropower Project

Prepared by Adjaristsqali Georgia LLC

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SEMI-ANNUAL ENVIRONMENTAL AND SOCIAL MONITORING REPORT

REPORTING PERIOD: 01 JUL 2015 – 31 DEC 2015

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SEMI-ANNUAL ENVIRONMENTAL AND MONITORING REPORT

1. Certification:

Georgia: Adjaristsqali Georgia LLC

Semi-Annual Environmental and Social Monitoring Report (SAMR) Reporting Period: 01 Jul 2015
– 31 Dec 2015

Company and Project Information:

Company: Adjaristsqali Georgia LLC ("AGL" or "the Company")

Physical address of the Company: 6 Irakli Abashidze Street
Batumi - 6010
Georgia

Company website: www.agl.com.ge

Project: The development, construction, operation and maintenance of the Shuakhevi and Skhalta hydro-electric power plants with total electricity generation capacity of 181 MW, to be located on the Adjaristsqali River in Georgia.

Authorised AGL representative who can be contacted by Lenders on the SAMR :

Name : Chandrashekhar Damle

Title : Chief Financial Officer

Company: Adjaristsqali Georgia LLC

Tel: +995577508801

Email: chandrashekhar.damle@agl.com.ge

Certification of the SAMR by Adjaristsqali Georgia LLC

I certify that the data contained in this SAMR completely and accurately represents Adjaristsqali Georgia LLC during this reporting period.

Chandrashekhar Damle



Adjaristsqali Georgia LLC Employee Name

Signature

2. Summary:

About construction activities

Civil Works: In general the Civil works are progressing relatively well but progress of above ground structures were expected to be impacted by winter conditions.

Tunnelling work: Tunnelling work continued for the main Headrace tunnel, Skhalta to Didachara transfer tunnel, and Chirukhistsqali to Skhalta Headrace tunnel sections with a total length of 28,485m completed. Power House concreting works continued with total concrete quantity of 19,500 m³ completed out of an estimated overall total of 24,530 m³.

Didachara dam area: Foundation excavation in weaker rock section at Monolith 8 & 9, completed. Formation level concrete in Monolith 4, 5, 6, & 7 completed & structural concrete for Monolith 4, 5, 6, 7, 8 and 10 has commenced/continued.

Skhalta dam area: Concreting of the invert completed and overt for south spillway diversion tunnel is nearing completion and concreting for invert for north spillway tunnel will continue. Excavation for the Skhlata PH cavern continued and six sections out of eleven have been completed. Chirukhistsqali weir: Intake structure slab and de-sander basin slabs concreting continued with 56% concrete placed till date.

EM Works: Basic designs of E&M Contractor have nearly completed. During the month of November concern regarding the GSUT for Shuakhevi powerhouse was resolved in discussions with the EM Contractor Alstom. The detailed design activities are approximately 85% complete. The project will move in to the erection and commissioning phase. Procurement, manufacturing, and delivery of equipment to site has progressed. Installation and commissioning of powerhouse EOT crane was completed. The use of EOT crane is presently limited to the assembly bay area and will be extended to Unit-1 and Unit-2 areas after the completion of civil works. The assembly bay has been handed over to Alstom for assembly works.

Skhalta Power House: CKD Blansko of the Czech Republic will do the supply and erection of three units each of 3 MW for the Skhalta powerhouse and for the Didachara micro-hydropower plant which shall have a total installed capacity of 145 kW, consisting of a Francis turbine, generator, governor, and associated electrical accessories. CKD is executing the works as subcontractor to AGE, the Civil Works Contractor.

35 KV Transmission Line: AGL selected New Metal Georgia as the contractor to execute the design, supply, installation and commissioning of the 35kV Shaukhevi-Skhalta Transmission Line Contract. While awaiting Lenders' approval, a Contract for "Early Works" in advance of the construction of 35 kV Shaukhevi-Skhalta Transmission Line was signed the 1st week December 2015. This covers detailed route survey, detailed geotechnical investigations, preparation of final route profile, final tower locations, EIA studies, archaeological studies, foundations, preparation of drawings, and identification of land plots.

Ghorjomi Bridge: "No Objection" from the Roads Department was obtained on November 11, 2015, and approval of the EIA for the Ghorjomi Bridge and associated road was obtained on November 27, 2015. AGL has therefore given permission to AGE to continue the construction of the bridge.

About Community Development:

AGL developed effective community investment plan in close cooperation with the representatives of the local government and key communities. The investment plan priorities three main directions: regional development, community empowerment and awareness raising and education.

Regional development implies improving local infrastructure and providing short-term employment to locals. AGL is being implementing various infrastructural projects. The objective of these projects

responds to the requests set forth by communities. These are projects such as improvement of the local roads, refurbishment of schools, donation of school supplies etc. These projects improved the life in the village, and additionally provide some locals with short-term employment. Implemented Infrastructural projects entail:

- Rehabilitation and gravelling of village roads
- Rehabilitation of potable water supply and drainage systems
- Rehabilitation of school libraries and supply with equipment
- Rehabilitation of school yards and sport halls
- Construction of gabions, etc.

Community Empowerment projects support improvement of locals' income generating capacities through training and providing small grants to start family business. AGL cooperates with Batumi based NGO called institute of Democracy (IOD) who is in charge of implementing Community Empowerment Project. The project targets 10 directly affected villages. Training groups were created in each village where participants acquired main skills in starting up family business. Upon submission of the project proposal, a Steering Committee created within the framework of the project selected the best project ideas for further financing. To date 21 businesses have been launched, with 69 people engaged.

Awareness raising and education projects provide English education and enrichment activities to students and teachers. The project envisions various activities. Trainings focused on improving local teachers' ability to teach English through a series of workshops focusing on language skills and instructional techniques. Totally 40 teachers from both municipalities have been participated in the trainings. Apart from teachers, classes were conducted for school children, directly 1302 beneficiaries were reached. In total, 1,422 local teachers and students took part during one or both phases of the project.

In addition to AGL supported a road safety awareness campaign in Khulo and Shuakhevi municipalities which aimed at increasing awareness of local population living in the vicinity of the hydropower development work on road safety.

AGL developed an effective communication procedure with key communities. In both municipalities public information centers play significant role for having daily communication with local villagers. Information leaflets, active media campaign, weekly meetings with representatives of local governmental bodies created strong basis for productive communication with key stakeholders.

3. Compliance evaluation:

Environmental compliance of the Shuakhevi HHP project against the Environmental Legislation of Georgian, ESIA requirements and other project document is regularly monitored by the Environmental Supervision Agency (ESA) of the Ministry of Environment and Natural Resources of Georgia. They are authorized to inspect the Company minimum once in a year and/or at any time in case of receiving grievances or calls from local population and any other agencies. During the reporting period ESA inspected the project several times, namely August, October, November and December of 2015. All the findings from previous inspections are closed, only approval of Spoil disposal areas project by the Ministry of Environment is still pending.

Even though AGL considers that finding of December Inspection from the Ministry, which is obliging AGL to install online landslide monitoring system in Chanchkhalo is not applicable to the Company, AGL accepted this obligation because of safety of locals and is in process of purchasing of online system in USA. Installation will be completed at the end of May, 2016.

The Land Acquisition and Livelihood Restoration Plan (LALRP) and Detailed Livelihood Restoration Plan (DLRP) received an Addendum update in mid-July 2015 to include the Ghorjomi Bridge and associated new road section. Following the submission of addenda comments were received from ARUP and AGL proceeded to revise the document. AGL commenced the land acquisition of land plots for the Didachara Access Road and Ghorjomi Bridge without lenders approval on the Addendum to LALRP though land acquisition process and compensation entitlements were followed as stipulated in the original LALRP. AGL is requested from Lenders to prepare Land Acquisition Completion Report for the Didachara access road and Ghorjomi Bridge which is a pending and the revised document will be submitted in April. Apart from the Completion report, AGL is requested to prepare an additional Addendum for the 35 KV Transmission Line that AGL is constructing as part of the Shuakhevi Hydro Power Scheme.

In mid-July AGL prepared and submitted Addendum to Detailed Livelihood Restoration Plan which is the part of the overall Detailed Livelihood Restoration Plan and represents the Company's approach to activities under the livelihood restoration. Based on the recommendations from Arup, AGL reviewed the Addendum to the DLRP prepared in June 2015 and re-submitted in November following the ARUP's visit.

AGL updated Stakeholder Engagement Plan (SEP) and submitted to ARUP and lenders in mid-July. Based on lenders comments, the SEP was revised and re-submitted again in November. Final approval from lenders for the disclosure is pending.

4. Major environmental and social achievements:

Main Environmental achievements during reporting period:

- Majority of the issues identified by Environmental Supervision Agency of the Ministry of Environment and Natural Resources of Georgia while inspecting the company in October 2014 were closed.
- Effective system of tracking environmental permit requirements was established.
- There was no reported damage caused by the project to the external environment around the Project or disrupted the wildlife that uses the surrounding areas for migration or the species that are native to the Adjara region.

AGL's Detailed Livelihood Restoration Plan (DLRP) was initiated in May 2015 with the commencement of Apiculture activities in Shuakhevi and Khulo. This was the first restoration measure to be introduced by AGL. AGL recruited the Tbilisi based NGO, Elkana to deliver and manage apiculture restoration measure to those that volunteered or showed interest in this option.

Through apicultural trainings affected farmers acquired the knowledge and increased capacities to make honey of a better quality and increase the number of bee hives. Apart from theoretical courses, farmers were also delivered bee hives with bee colonies and all needed equipment. In parallel to beekeeping project, AGL also launched cattle breeding training for the affected persons. AGL selected Tbilisi based NGO called ABCO Georgia for managing this project.

CSR projects helped a lot to mitigate social negative impact associated with the project and establish good relationship with communities. Details about the CSR projects are given in Chapter 5.

5. Major challenges and issues for the Company:

Major challenge of the Company during reporting period is to secure approval on Spoil Disposal Plan by the Ministry of Environment. Problem is caused because of lack of clear Georgian regulations regarding the requirement toward the projects on Arranging Spoil Disposal Areas. Ministry of ENV has discretion to establish as much requirement as they consider relevant in particular case. To address non-compliance AGL strictly instructed contractor to hire specific consulting company with long term experience of cooperation with the Ministry who is now working on the Project. The project will be updated according to Ministry's recommendation and submitted to the Ministry in April / May 2016.

Through the months of April through September 2016, a series of tunnel breakthroughs are expected starting with the Headrace Tunnel first. The Owner's Engineer and Civil Contractor are making preparations for associated key aspects such as water control, lighting and ventilation changes.

As for social, demand for more employment stays one of the major challenges for the project despite a fact that more than 500 local villagers are employed in ongoing construction activities in both municipalities and more than 200 locals were provided for short term employment within AGL's CSR projects.

For livelihood activities a low show of participants in beekeeping trainings appears to be a challenge. Since the attendance and performance at training is the requirement for the eligibility for receiving this equipment, those who did not attend the training and received bee hives will be required to attend additional training organized by the Elkana but they will not receive the second delivery of equipment. For the eligibility of receiving the second delivery 80% of attendance on the training is required.

6. Key Project implementation data relevant to E&S performance evaluation:

- 6.1. Start of construction date: 26 July 2013
- 6.2. Start of commercial operation date: 01 April 2017 (scheduled as per CTA)
- 6.3. Gross electricity generation capacity (MW): 187 MW
- 6.4. Net electricity generation capacity (MW): will be updated on COD
- 6.5. Gross Electricity generated during the reporting year (GWh/year): NA
- 6.6. Net Electricity generated during the reporting year (GWh/year) – NA Total, a portion exported to Turkey, a portion delivered to Georgia:
- 6.7. Plant capacity factor (%) – $\text{Gross Electricity generated (GWh/year) / Gross electricity generation capacity MW} \times 8,760 \text{ hour/year}$: NA
- 6.8. Number of workers as of Dec 31 of the reporting year
 - 6.8.1. Number of direct employees of AGL:
42 in total disaggregated as 12 expatriate (of which 6 on long term deputation from sponsors) and 20 Georgian. AGL also employs an additional 125 local people to undertake small CSR projects in affected communities. This brings the total to 167 Georgian and 12 expatriate = 179 persons in AGL.
 - 6.8.2. Contractors:
 - Civil Works Contractor: AGE Batum
 - Number of employees: 1320 of which 752 Employees (mainly Turkish workers) and 568 Georgian workers
 - Electro-Mechanical Works Contractor: Alstom India
 - Number of employees: 27 of which 27 Expat employees
 - Owners' Engineer: Mott Macdonald Ltd UK
 - Number of employees: 41 of which 18 Expat employees and 23 Georgian employees

7. Compliance with IFC Performance Standards / EBRD Performance Requirements

/ ADB Safeguard Policy Statement (SPS):

7.1. PS1/PR1/SPS – Assessment and Management of Environmental and Social Risks and Impacts:

AGL's use of local NGO's was continued through this reporting period. All 3 NGO's continue to produce monthly reports that make assessment of the BAP requirements and possible effects on the environment outside of the Project boundary. An annual review of the NGO Reports revealed no impacts on the environment were incurred as a result of the Project construction activities. The Project BAP Rev H was released in December 2015. These above mentioned NGO Reports were reviewed by the Mott McDonald BAP Specialist and the data contained within assisted with the BAP update.

One of the risks from social part is keeping effective grievance procedure for key communities. Therefore AGL improved grievance procedure in close cooperation with the contractor company AGE Batumi. Community Liaison Officers (CLO) from AGL and AGE are points of contact for written comments and grievances concerning the project and in charge of disclosing all relevant information, meeting with stakeholders and documenting all interactions.

In addition to this one of risks is having a productive information exchange among all key stakeholders on project implementation and construction activities, as well to get feedback from local communities. Public Information Centers (PICs) in the Shuakhevi and Khulo municipalities play more significant role for having effective information exchange among all key stakeholders.

Moreover, in 2015 AGL has actively collaborated with the major media outlets in both municipalities. AGL has strived to effectively share information with media organizations such as the Ajara TV and TV 25 television stations and the *Adjara*, *Khulo*, and *Shuakhevi* regional newspapers. Finally Information leaflets, active media campaign, weekly meetings with representatives of local governmental bodies created strong basis for productive communication with key stakeholders.

One of the major social risks stays an increasing employment demand. AGL mitigates this problem with active CSR campaign. In particular AGL was very active with short employment programs for infrastructural projects as well with supporting community empowerment e.g. funding start up capitals for small business enterprises. Finally, AGL collaborates intensively with AGE, as well community leaders on employment issues (e.g. informational campaign).

(a) E&S Assessment and Management System / Policy: Please provide an updated summary description of the environmental, health and safety (EHS) management system of the Company (organizational chart, budget, reporting lines, responsibilities, policies, procedures). Please attach the Company's latest EHS and social policy statement. If the Company's EHS management system was internationally certified (e.g. ISO 14001, OHSAS 18001), please attach a copy of the certification.

(b) Identification of Risks and Impacts:

The Shuakhevi powerhouse construction works presented some of the biggest risks to workers health and safety during this reporting period. On November 25th 2015, ARUP conducted a scheduled audit on behalf of the lending group and unsafe acts were recorded that had potential to

threaten life. AGL took immediate steps to rectify the unsafe and unsafe condition at height.

The delivery of safety and environmental information to the workforce will continue to pose problems through to construction completion late in 2016. The civil Contractor will continue to translate safety and environmental documentation with the aim of increasing the skill level of the local workers that are predominantly from an agricultural background.

The Electro-Mechanical Contractor, Alstom, number 26 as of December 2015. This number is made up of English speaking or Turkish speaking personnel; no Georgian staff are employed and therefore no Georgian translation of safety or environmental documentation is required.

(c) Organizational Capacity and Competency: Please provide a summary of the latest organizational structure of the Company (roles and responsibilities) in charge of EHS and social issues. Please provide a summary of training programs carried out including planned capacity building programs, if any.

AGL's social team numbers 15 persons. Of these 8 employees have the role of distributing Project information to the community as well as recording grievances and advising the public on Project status new phases of work and possible employment opportunities. Unexpectedly, the most significant challenge of the AGL social team was to obtain suitable contributions for the AGE (Contractor) social team. During this reporting period, the AGL social team has worked closely with the Contractors social team but with limited results. The affected communities are using AGL's social team as the main point of contact for all means of communication and grievance. A major target of 2016 is to have the Contractors team become more involved in the affected communities with a view to answering queries in the communities, dealing with complaints at ground level to prevent grievances being raised.

(d) Emergency Preparedness and Response:

The Project has developed area specific procedures to deal with emergencies. AGE, with input from AGL, has developed and Emergency Response Plan and Spill Response Plan. These Plans show how, who and when these Plans will be initiated. They also contain roles and responsibilities along with communication lines.

The list of Emergency Response Plans (ERP) is named below:

1. AGL HSE Plan, dated June 2015
2. AGE HSE Plan, dated June 2015
3. Emergency Spill Response Plan, dated June 2015
4. Community Emergency Response Plan, date November 2015

For serious occurrences that could have a material adverse impact on the Project the AGL Project Director & Chief Financial Officer will notify the Lender group as per the CTA to advise of the occurrence, measures taken and rectification action that will be adopted to redress loss and prevent recurrence with future activities or emergencies that concern the affected communities.

(e) Monitoring and Review:

If the Company publicly reported on overall E&S performance (e.g. sustainability report), please describe how it was done. Please also provide a summary of the Company's internal inspections and audits conducted to verify E&S performance compliance.

AGL has conducted internal monitoring of the HSE performance and compliance with the project HSE Plans, RAMS and Lender's requirements. Weekly and monthly site inspections are carried out between the Client, Owner's Engineer and Contractor in H2 2015. The outcome of these written inspections recorded several minor to moderate environmental violations as a result of construction activities. However, the Project has an active management system that initiates corrections at site or on a time weighted basis dependent on severity of breach.

In October 2015, Mott McDonald UK conducted their planned Environmental Compliance Audit. This was completed over 4 days on site. The Audit has been made available to the Lenders auditors, ARUP.

Owner's Engineer (OE) on the Project, Mott MacDonald is responsible for monitoring the compliance of AGE the Civil Contractor (the Contractor) with international and national environmental standards. Fourth quarterly audit of 2015 was conducted between 02 November and 05 November 2015, and covers the period 01 August 2015 to 05 November 2015. Audit report was submitted to AGL in December.

During reporting period joint site environmental inspections were conducted weekly. OE environmental engineer, contractors and AGL's environmental officer are inspecting sites jointly and reviewing result at the regular meetings. Results are submitted to AGL.

Monitoring, evaluation and reporting are key elements of the CSR and LRP activities. The activities are subject to internal and external monitoring. Internal monitoring is conducted by AGL social staff on a regular basis, assisted as necessary by the social advisor; as for external monitoring, it will be assigned to an independent organization with expertise in monitoring of the similar projects. This section covers the process of on-going monitoring and evaluation.

Internal monitoring

AGL social team consists of 16 team members out of whom 9 are directly involved in implementing CSR and LRP activities. They are involved in:

- informing locals about the upcoming project; disclosing information on project activities;
- assisting partner organizations in organizational issues;
- attending and observing the progress of projects

Apart from site visits, partners' obligations and their performance are assessed against contracts, timeframe and budget.

Results of internal monitoring are included in monthly progress reports. AGL set up a database in order to record all CSR and LRP activities in the affected villages. Recording activities assist AGL staff to monitor the project progress against the baselines. The database covers all activities which are financed from the CSR/LRP budget.

External monitoring

The external monitoring will be carried out by third-party agreed by AGL and lenders. The monitoring should review the internal monitoring findings and verify through by-annual site visits.

Reporting

Reports are prepared on a monthly basis by partner organizations or sometimes depending on the scale of work upon the completion of the activity and submitted to AGL. AGL reviews the reports and checks performance of partners and results of the activities. All activities are covered in Monthly Progress Report and shared with management and owners.

(f) Stakeholder Engagement:

AGL social team and AGE social officers took a more active role in engaging local communities and local government representatives. The active participation of AGE's social team ensured the active involvement of the contractor company and contributed to establishing productive communication among key stakeholders and the contractor. AGL maintained active communication with key stakeholders such as local communities and local government. In particular, the positive role of PICs is widely recognized by these stakeholders.

In addition AGL intensified communication with key communities by addressing community leaders on regular bases. AGL information and community officers played a crucial role through their daily contacts with representatives of communities and by regular field visits in key communities which are located close to working areas. Informational meetings were held with the representatives of the local government in key communities such as village heads and representatives of the mayors' offices.

It is important to note that in 2015 AGE social team members continued to work alongside AGL's own social team and have taken a more active role in engaging local communities and local government representatives. 2015 was also very active with respect to AGL's communication with relevant local and national media representatives and outlets in both municipalities.

4.2 PS2/PR2/ADB's Social Protection Strategy 2001 – Labor and Working Conditions:

(a) Human Resources Policies and Procedures: If the Company received complaints through internal grievance mechanism for workers or through national regulatory agency/courts, please provide a summary of those, particularly about issues of labor union membership, non – discrimination, provision of mandated benefits including wages and medical and other social insurances, involuntary retrenchment, local employment and occupational health and safety.

The Project has not received any claims and allegations of mistreatment by employers. The Project has an internal grievance mechanism which can be completed anonymously if chosen by the claimant. New starters to the Project are made aware of the grievance mechanism at the site induction stage before commencement of work and periodically at toolbox talk's sessions in the workplace. Management operates an 'open door Policy' for workers in all positions to approach them anonymously or otherwise to discuss grievances or concerns.

Labour condition i.e. accommodation, welfare arrangements and leisure facilities are assessed on a monthly basis as part of the joint HSE inspection process mentioned above in the 'Monitoring and Review' section.

(b) Workers Organization: Please provide a summary of whether the Company complied with national law in allowing workers to form and join workers organizations without retaliation or discrimination. Please provide a summary of workers organizations with numbers in member workers relative to total employees.

Name(s) of the workers' organization(s)

The Project, in most part uses AGL's legal team to advise Project management organisations and unions. The AGL team has close working relationships with both the Owners' Engineer and the Contractor AGE. To date no organisations have been sought out by workers; managers encourage freedom of speech and would welcome the addition of union involvement on the Project in a controlled and proportionate measure.

Number of direct employees of AGL: 42 in total disaggregated as 12 expatriate (of which 6 on long term deputation from sponsors) and 20 Georgian. AGL also employs an additional 125 local people to undertake small CSR projects in affected communities. This brings the total to 167 Georgian and 12 expatriate = 179 persons in AGL.

Contractors:

Civil Works Contractor: AGE Batum

Number of employees: 1320

752 Employees (mainly Turkish workers) and 568 Georgian workers

Electro-Mechanical Works Contractor: Alstom India

Number of employees: 27

27 Expat employees

Owners' Engineer: Mott Macdonald Ltd UK

Number of employees: 41

18 Expat employees and 23 Georgian employees

(c) Retrenchment:

The company hasn't undertaken involuntary retrenchment during the reporting year. However the company in close collaboration with the contractor company developed retrenchment plan. The process will start March 2016 and will last till completion of construction activities in January 2017.

(d) Grievance Mechanism:

AGL has continued to record grievances against the Project by the communities. These grievances

are then analysed by senior members of AGL and AGE to allow appropriate action to be taken. AGL and AGE hold weekly meetings to discuss the status of outstanding grievances and the update the grievance register accordingly.

Community Liaison Officers (CLO) from AGL and AGE are points of contact for written comments and grievances concerning the project. AGE/ AGL Community Liaison Officers organize quarterly meetings with workers in all working places in both municipalities. There are following issues raised so far: bad internet connection, insufficient uniforms and a poor food quality in canteens. In order to respond above mentioned complaints Community Liaison Officers (CLO) from AGL and AGE are working with camp managers in all camps. It was decided to involved subcontractors for all canteens in order to improve food quality. Moreover, AGL and AGE social team agreed to have monthly inspections and monitoring in all camps in both municipalities.

(e) Child Labor / Forced Labor:

Company is in compliant with the child and forced labour requirements of the performance standards.

AGL has ensured the Project is compliant with the Child Labor Standards and the Child Labor laws of Georgia. This has been achieved, and the standard will be sustained by having close involvement from the AGL legal team, active monitoring by AGL and the Contractor. At present the youngest age on the Project is 19. Such persons are subject to lower risk activities and subject to close management scrutiny in a team of experienced workers. Child labour is assessed monthly and quarterly as part of the management audit system.

(f) Occupational Health and Safety (OHS):

As of December 2015, the Project employed approximately 566 local people and 800 Turkish people. The Project, from June 2015 to December 2015 employed an average of 1440 people. This figure includes all office and support personnel based at the camp areas and Batumi Offices.

By December 2015, the Project recorded 32 accidents; the same period in 2014 the Project incurred 45 accidents. This significant reduction was due to sustained safety delivery by the Projects internal teams and others such as external auditors and training providers to help ensure that safety related information for workers, especially local workers with a predominant agricultural background was comprehensible

The most significant accident occurred in H2 of 2015 occurred on the 21st July; A Georgian national received a broken leg due to unsecured rebar on a flat surface at the bar-bending yard close to the Shuakhevi Powerhouse. In 2015, the Project sustained a total 20 vehicle accidents, 9 of these occurred in H2 and 11 in H1. In 2014 the Project sustained 21 vehicle related accidents. One of the biggest was, and remains for the Project from a safety perspective, is the driving style and ability of driver; including plant operators. Of the 20 recorded vehicle accidents in 2015, 11 were due to driver error, the remaining 9 were down to inadequate space in work areas for vehicle access resulting in minor body panel damage.

In November 2015, the Lender's Project Auditor, ARUP, undertook a week long audit to compare

site operations along with social obligations to Lender requirements and national legislation. A brief memo was issued to Lender's and AGL in December 2015 with a full report expected in 2016. Regrettably, during the Audit, AGL objected to some of the language and direction of the Memo. AGL clarified with ARUP that the key HSE failings were noted in the Shuakhevi Powerhouse and not site-wide as the memo eludes. The Lenders were also informed of this. AGL expects to see greater clarity in January when the full report becomes available.

The most common failing with environmental management were filtration system failings with sediment ponds, there were improvements in comparison with the H1 of the 2015 Semi-Annual report but more is required before this aspect could be classed as 'satisfactory'. The civil Contractor's environmental engineer conducted specific spill prevention, containment and disposal training to address the noted failings in addition to the Contractor's site managers deploying more mechanical resources to clean out sediment ponds and improve the silt traps used to stem the flow of water and filter suspended solids.

The addition of a pro-active environmental engineer into the Owners' Engineer (OE) in September 2015 has seen significant improvements with documentation compilation, spill response knowledge and improvement with the relationship between the OE staff and Contractor's staff. No serious anomalies were identified during the ARUP November 2015 Audit on the behalf of the Lenders with the environmental management.

Occupational Health and Safety Performance (Construction / ~~Operation~~ Phase)

Item	Number			Target
	Employees	Contractors	Total	
A: Fatalities:	0	0	2	
B: Total Lost Time Accidents (including vehicular):	4	4	28	
C: Total number of lost workdays resulting from incidents.	4	4	102	
D: Total man-hours worked this reporting period:	172,800	2,021.296	5.930,694	
E: Incidence during this reporting period: (Note: Incidence = total lost workdays / total hours worked)	4	0.018	0.006	
F: Lost Time Injury Frequency Rate (Number of lost time accidents x 1,000,000 hours / total man-hours worked = injuries per million hours worked)	4	1.97	0.67	
G: Lost Time Severity Rate Total Lost workdays x 1,000,000 hours / total man-hours worked = lost workdays per million hours worked)	4	1.97	0.67	7.5 or less (construction phase) or 4.5 or less (operational phase)

Improvement Trend of Occupational Health and Safety Performance

Item	2014	2015	2016	-----
A: Fatalities: [Employees] [Contractors] [Total]	0	2		
B: Total Lost Time Accidents (including vehicular): [Employees] [Contractors] [Total]	18	28		
C: Total number of lost workdays resulting from incidents: [Employees] [Contractors] [Total]	69	694		
D: Total man-hours worked this reporting period: [Employees][Contractors] [Total]	2.94,894	5,930,694		
E: Incidence during this reporting period:	0	0.006		
F: Lost Time Frequency Rate (employees) (Contractors) (Total)	9	0.67		
G: Lost Time Severity rate (employees) (Contractors) (Total)	8.8	0.67		

- 1 Please attach separate reports detailing the circumstances of each fatality. Also discuss how the company has provided benefits/assistance to the worker's family.
- 2 In capacity to work for at least one full workday beyond the day on which the accident or illness occurred.
- 3 Lost workdays are the number of workdays (consecutive or not) beyond the date of injury or onset of illness that the employee was away from work or limited to restricted work activity because of an occupational injury or illness.

(g) Workers Engaged by Third Parties: Please provide a summary of how the Company is managing and monitoring the performance of third party employees in relation to the requirements of the PSs / PRs.

Third parties such subcontractors and consultants are subjected to weekly and monthly monitoring practices by AGL, MML and AGE management. Records, such as inspections and audit are maintained at the main camp. AGE (contractor) employ third party organizations for calibration services and testing or key site items such as lifting equipment and cranes. These third party employees or visitors are subjected to the same induction and supervision practices as full time Project employees on the Shuakhevi HEPP.

4.3 PS3/PR3/SR1 – Resource Efficiency and Pollution Prevention:

(a) Resource Efficiency – Greenhouse Gas (GHG) emissions avoidance: Please provide the Company's estimate about the GHG emissions avoidance effect of the Project:

GHG emissions avoidance of the Project: Project is in Construction Phase during reporting period

Year	Gross electricity generation (MWh / year)	Auxiliary electricity consumption (MWh / year)	Net electricity generation (MWh / year)	Grid emission factor (tonCO ₂ / MWh)	GHG emissions avoidance (tonCO ₂ / year)
	A	B	C = A – B	D	E = C x D
PDD for CDM					
Actual					
2015					
2016					
2017					

Estimated CO₂ Emissions from Mobile Sources (Gasoline Vehicles)

	Total number of vehicles	Total length of distance travelled (km)	Gasoline consumed		Gasoline vehicle efficiency (litre / km)	CO ₂ emissions factor (kgCO ₂ /TJ-LHV)	CO ₂ emissions (tonCO ₂)
			(litre)	(TJ - LHV)			
		A	B	C	D=B/A	D=69300	E=BxD/1000
2014	2	400	30		0,075	69300	0,00225
2015	3	532	105		0,080	70850	0,00386
2016							
2017							

Note: CO₂ emissions factor (gasoline) 69300 kgCO₂/TJ-LHV from 2006 IPCC Guidelines.

Estimated CO₂ Emissions from Mobile Sources (Diesel Vehicles)

	Total number of vehicles	Total length of distance travelled (km)	Diesel consumed		Diesel vehicle efficiency (litre / km)	CO ₂ emissions factor (kgCO ₂ /TJ-LHV)	CO ₂ emissions (tonCO ₂)
			(litre)	(TJ - LHV)			
		A	B	C	D=B/A	D=74100	E=BxD/1000
2014	292	400	30		0,075	69300	0,00225
2015	294	1153988	873852		0,7572	74100	661,68
2016							
2017							

Note: CO₂ emissions factor (diesel 011) 74100 kgCO₂/TJ-LHV from 2006 IPCC Guidelines.

Pollution Prevention - Waste: Please provide a summary of non-hazardous and hazardous waste generation and minimization activities using the table below. Please add a summary description of major recycling activities conducted.

Non-hazardous and Hazardous Waste Minimization Activities

Item	Non-hazardous waste				Hazardous waste			
	Generated (ton)	Re-cycled (ton)	Disposed (ton)	Recycling ratio (%)	Generated (ton)	Re-cycled (ton)	Disposed (ton)	Recycling ratio (%)
	A	B	C=A-B	D=B/A	E	F	G=E-F	H=F/E
2014 June - Dec	285	-	285	0%	13,71	13,71	-	100%
2015 Jan- June	236,4	-	236,4	0%	27,30	27,30	-	100%
2015 July - Dec	91.35	-	91.35	0%	20.94	20.94	-	100%
2016 Jan – June								

Please add a summary description of major recycling activities conducted.

The Contractor's waste segregation system in the workplace and camp areas. This system comes in the form of colour coded waste bins. However, this waste is then taken to a licensed refuse in the city of Batumi where no such waste segregation of waste recycle exists resulting in mixing of the waste categories. AGL has made several calls to the waste disposal unit in Tbilisi to confirm receipt of the hazardous waste and the correct quantities as per removal Hazardous waste types are segregated in the workplace. This waste is then collected in suitable vehicles under license and taken to Tbilisi where a license hazardous disposal factory receives the waste.

In November 2015 AGL Environmental team was trained in a new Waste management Code of Georgia which is now in line with EU regulations. 5 day training was arranged by the Ministry of Environment and Natural Resources Protection in Tbilisi for AGL team. Trainers were - head of waste management department of MoE and Main Environmental Inspector of Georgia. According to new legislation requirement AGL has obligation to submit waste inventarization report to MoE until Augusts 2016 and update Waste Management Plan until December 31, 2016. AGL will be under strict monitoring from Environmental Supervision Agency to comply with legislation requirement.

4.4 PS4/PR4/SR1 – Community Health, Safety, and Security

(a) Implementation of key actions for community health and safety (dam safety):

Didachara dam works were ongoing through this reporting period and will be in the first half of 2016. Skhalta dam were commenced in late 2015 with abutment excavation and slope stabilisation works in readiness for dam excavation works. Both dams are, and will be constructed to the design, dam designs have a programmed safety factor *design-in* to allow for local geology factors for the region and normal operational pressures.

In November 2015, the Government of Georgia approved the AGL Community Emergency response Plans. The acceptance letter from the GoG was issued to the Lender's Auditor, ARUP as evidence.

(b) Implementation of key actions for security personnel management: Please provide a summary of the planned key mitigation measures of the security staff about appropriate use of force where applicable toward workers and affected Communities.

All security personnel working on the Project are subject to onsite supervision for key installation such as the fuel store, magazine store and main camp. Outlying camps at Chiruqistsqali, Didachara and Skhalta are managed by the contractor and a lead security guard. AGL has a strict Policy on security and its implementation. During this reporting period, no use of force was necessary an facility belonging or associated with the Shuakhevi Hydro-Project.

The security arrangements were assessed in November 2015 by the ARUP audit team. No major

anomalies were recorded.

(c) Implementation of key actions to other incidents. Please provide summary of incidents recorded including date, scale of damage and injury, if any; authorities in charge of investigation / recording and media or community reactions, if any; action taken to respond to the incident; and any outstanding issues and proposed measures. Please provide any other health and safety events or out-reach activities including incidents that have caused damage to the environment or to human health, and/or attracted attention of outside parties (e.g., fire, explosion, chemical or oil spill, and pollution release).

At Shuakhevi Powerhouse, a steel reinforcement bundle rolled onto a Georgian AGE employee's leg causing a fracture. This was recorded as a lost time accident in the Project's accident register. The accident revealed that wooden chocks, especially designed to stop the rolling of the circular reinforcement bar bundles, had not been installed in an effort to save time.

A side from the accident mentioned above, 11 other accidents were recorded, 9 of which were vehicle related. The 9 vehicle accidents resulted in minor body panel damage; no injuries were sustained as a result of these accidents.

The remaining two accidents consisted of one operative sustaining light facial bruising because he stepped on a rake that was left lying in the workplace after concrete works and another worker in the Shuakhevi Powerhouse that fell 1.4 off a ladder also incurring facial bruising; this operative lost 2 days from work. This LTI occurred due to the supervisor's failure to organise a working platform and the operative over reaching, shifting the centre of gravity that caused the ladder to slip on the concrete surface.

No serious environmental incidents in the second half of 2015. No fire, gaseous or dust discharges were recorded, likewise, no harm was caused to watercourses, tree, and grass or crop land.

4.5 PS5/PR5/SPS – Land Acquisition and Involuntary Resettlement:

(a) Land Acquisition. Livelihood Restoration: Please provide a summary of the land acquisition and livelihood restoration, including implementation of the Land Acquisition and Livelihood Restoration Plan. Identify any gaps and the corresponding measures/corrective actions undertaken by the Company.

AGL updated LALRP and DLRP documents and submitted updated versions to the lenders in November. Updated LALRP covers land acquisition for the Ghorjomi Bridge and the related road section. 29 landowners/users were identified. AGL employed service of the Georgian consultant Expert 21 to assist AGL land officers in land and fruit valuation. AGL applied the same approach for the compensation as it did for the Shuakhvei scheme. Current status: all land required for the

works has been acquired and is in AGL ownership. All contracts have been signed and compensation been already paid out. Total amount of land compensation is 278,161GEL (123,819.71USD) and total amount of fruit trees compensation – 36,355GEL (16,182.95USD).

All Affected Persons (APs) from the Ghorjomi Bridge project have been mapped through the Rapid Assessment Survey for the eligibility to livelihood restoration activities.

As for the 35kV Transmission Line there is still limited information with regard to the land for the line, engineering team has worked closely with AGL land team selecting the options for the route. Once land purchase process is completed a separate addendum will be prepared and shared with lenders.

The Diakonidzeebi weir is also under consideration, if developed the project will require land acquisition. Information on new plots will be included in a separate Addendum.

LALRP CAP

The Mott MacDonald Corrective Action Plan Audit undertaken in 2014 has been predominantly closed but some items are classed as 'Ongoing' in the first half of 2015. The CAP items are subjected to monthly internal monitoring by AGL line managers to ensure that standards are maintained.

There are a small number of ongoing actions, or actions that were not due at the present time, which are presented in an updated CAP in section 3 and summarized as follows:

- Implementation of the Detailed LRP
- Monthly internal monitoring reports on resettlement to be submitted to ADB
- Organization of AHs into correct categorization on data spreadsheets
- Preparation of an Addendum LALRP when new land needs to be acquired
- Updating the spreadsheets (or creation of new spreadsheets) when new land is acquired
- Preparation of a Completion Audit when all land has been acquired

AGL now has suitable personnel resources and competence to manage these systems in line with Lenders Standards. In addition, the UK based Consultant, ARUP have been contracted to conduct independent quarterly or semi-annual reporting on behalf of the Lenders group. ARUP will be focusing on the LALRP, DLRP and Stakeholder Engagement Plan (SEP) implementation and key items for AGL.

In July 2015, this procedure was changed to quarterly desk top studies and 6 monthly inspections of the Project by designated members from ARUP and the Lending group.

(b) Please provide a summary of PS5/PR5/SPS related stakeholder engagement and outcomes.

AGL's land acquisition process involves active communication with all stakeholders. During working meetings with the representatives of the local government AGL's land officers and community liaison officers are updating local authorities with all details of ongoing land acquisition process (communication process, with land owners, planned livelihood activities etc.). At the same time AGL land and social team is in active communication with land users and land owners in order to inform them about all relevant details of land acquisition process. Furthermore AGL social team consulted local land owners and land users about planned livelihood activities prior starting the livelihood projects. In addition, AGL social team developed informational leaflets which specifically provide information about land acquisition procedure.

4.6 PS6/PR5/SR1 – Biodiversity Conservation and Sustainable Management of Living Natural Resources

The obligations in the BAP for the construction activities are being managed by AGL environmental team and local NGO's that monitor tree, plant, mammal, reptile, amphibian and bird species for potential impact. The NGO's are PSOVI (birds and mammals), Flora & Fauna (river habitat and water based species & MTA-BARI (Plant and tree life).

To identify any actions needed to improve the BAP and its implementation AGL commissioned MML to provide in internal review and the roadmap for addressing actions. MML Biodiversity Specialists visit the project between 12 and 16 October and conducted review through site visit, interview with key personal and review of relevant documentations. MML specialist also provided AGL with Technical Review of Biodiversity Monitoring Reports provided by environmental NGOs. All recommendations provided through technical review will be taken into consideration by NGOs in their further monitoring activities.

(a) Implementation status of key actions:

During reporting period mitigation and compensatory measures of BAP for protection of biodiversity was implemented as required. Among them:

- Active campaign for the awareness raising on Biodiversity issues was conducting in Khulo and Shuakhevi villages and for Civil contractor.
- To offset for the loss of suitable roosting sites for bats, AGL has organized bat boxes installation with the help of NGO Psovi and school pupil. Boxes will be monitored annually during next 5 years.
- Regarding tree compensation measures, AGL is in process of negotiation with Forestry Agency to find suitable land plots for tree compensation. During reporting period Forestry Agency handed 3 ha. Land plot to AGL for reforestation. Detailed project for planting was developed by specialist and was submitted to the MoE for approval. AGL is

continuing activities to obtain enough land plots for compensation.

(b) Ecological flow management:

Company is obliged by the EIA permit condition to perform hydrological monitoring on the river flows and quarterly submit result to the Ministry of Environment of Georgia. With the approval of the Ministry 3 River gauging station were installed. In parallel Company has service agreement with the National Environmental Agency of the Ministry of Environment, the team from National Environmental agency regularly measures water discharge and providing AGL with appropriate data. They are providing AGL with final hydrological curve as well. Hydrological data quarterly is sent to the Ministry of Environment as required.

To determine whether there is any changes of the of water biodiversity, from 2013, twice in a year, AGL is conducting Phase II survey, particularly, macro-invertebrates and fish survey (MM). Local NGOs are involved in monitoring process.

Late in 2016 AGL will commence the design of the Operational Manual for the Project. The data collated during the pre-construction in line with the ESIA, and data collated during the construction phase will help the conclusions and decision during the Operational Manual design.

4.7 PR10/SPS/ADB's Public Communications Policy 2011 – Stakeholder Engagement

(a) Implementation status of key actions:

AGL social team has an effective communications procedure for all key stakeholders involved in the project.

Below is presented timeline for informational meetings with key stakeholders (2015)

#	Meeting	Participants	Issue	Frequency	location
	Informational Meeting	Information Officer / Community Liaison Officer (AGL / AGE) Deputy Mayor (local authorities)	Ongoing issues ¹	Monthly	Mayor Office
	Informational Meeting	Land and Social Director (AGL) Mayor (local government)	Ongoing issues	Monthly	Mayor Office / Main Camp
	Informational Meeting	Community Liaison Officer / Informational Officer (AGL / AGE) / Land and Social Director (AGL)	Ongoing issues	Monthly	Public Informational Centers (PIC)

#	Meeting	Participants	Issue	Frequency	location
		Representatives of the mayor office in the communities (local government)			
	Informational Meeting	Community liaison Officer / Information Officer (AGL / AGE) Representatives of the communities / villages e.g. community leaders, women groups, teachers, workers AGE / AGL (key communities)	Ongoing issues	Monthly	Public Informational Centers (PIC) / Main Camp
	Informational Meeting	Chief Executive Officer / Project Director / Land and Social Director (AGL) Mayor (local government)	Ongoing issues	Monthly	Main Camp / Mayor Office

At the same time along with key stakeholders by organizing informational meetings AGL targets also specific groups in order to increase their awareness about the implementation of the project and as result to deliver information effectively among to wider audience of local residents.

As for SEP, it is modified periodically.

(b) Information Disclosure:

All key documents related to the project implementation are disclosed on the web page www.agl.com.ge. In addition, Public Information Centers in both municipalities distribute information on social, land, Environmental and technical topics to the community leaders and the representatives of the mayor's office. Finally, critical details of construction activities are displayed as PP on monitors which are installed in all Public Information Center

(c) Public Grievance Mechanism:

AGL keeps registering individual or collective grievances from both municipalities. Grievances are submitted via public information centers and acted upon in line with the AGL's and AGE's grievance policy.

Any comments or concerns can be brought to the attention of the company verbally or in writing (by post or e-mail) or by filling in a grievance form.

Most of the grievances are relating to ground spring water output and house deformations. Community Liaison Officers (CLO) from AGL and AGE are points of contact for written comments and grievances concerning the project. All grievances are acknowledged by the AGL and AGE social teams within 10 days. If immediate corrective action is available it will be taken within 5 days; if no immediate corrective action is available, a response will be provided within 21 days, unless there are exceptional circumstances.

Grievances during construction are categorized based on validity and risk level by the AGL and AGE social team. Where investigations are required, project staff and outside authorities, as appropriate, will assist with the process. Social team members from both companies will collaborate with AGL and AGE management to identify an appropriate investigation team with the correct skills to review the issue raised and to decide whether it is Project related or whether it is more appropriately addressed by a relevant authority outside the Project.

The Community Liaison Officers (CLOs) from AGL and AGE will explain in writing (or, where literacy is an issue, orally) the manner in which the review was carried out, the results of the review, any changes to activities that will be undertaken to address the grievance and how the issue is being managed to meet appropriate environmental and social management systems and requirements.

Individuals do not have to give their name or can request their name be kept confidential. AGL cannot communicate responses to anonymous grievances. It is important to note that this mechanism does not take the place of legal rights that people have. Even if a person submits a grievance, he or she may use other legal avenues to achieve their goals.

5. Corporate sustainability activities:

In the second half of 2015 AGL broadened its scope and targeted CSR projects in such areas as education and awareness raising, support local business startup and development of regional infrastructure.

AGL targets to improve locals' income generating capacities through training and providing small grants to start family business. AGL financed 21 new businesses in the valley with 69 people engaged running these businesses.

AGL continues financing tuition fee to those 8 students which were selected in 2014 for the scholarship. These students are from the affected communities and enrolled in state universities. AGL held internship program for 3 students from the Tbilisi Technical University. Internship lasted for summer period and targeted civil/geotechnical engineering students this year with more room for electro-mechanical next year. Students spent most of the time in field and worked closely with Contractors' engineers. Interns rotated so all of them could work in all three locations: powerhouse, tunnels, and dams.

AGL initiated a new project targeting only the 12th grade high school children to assist them in university entrance English exam. 5 hub schools have been selected in Khulo and Shuakhevi municipalities where 135 pupils take free English classes. Ministry of Education of Adjara and local resource centers are partnering AGL in this project.

From September through December, 2015, the second phase of AGL's English Education Project was carried out as a part of the AGL's continuing social responsibility efforts. This project was a continuation of a project which we started in the spring of 2015 to address deficiencies in English education in areas of upper Adjara affected by the construction of the Shuakhevi HPP. The program aimed to improve teacher training and teachers' ability to use English by offering a thrice-monthly teacher training program and to improve students' English skills with targeted after-school activities for older students and an English spelling competition for younger students. In addition, the program created several benefits for AGL, including increased visibility for AGL's social responsibility efforts, both among project participants and through coverage in local media, and document editing services for non-native English speaking AGL employees.

AGL continues meetings with locals on health awareness. Following training with women on breast cancer and abortion and contraception, meetings and testing on B&C hepatitis, HIV/AIDS were held in ten affected villages. In addition to local residents, trainings were also held for medical personnel in Khulo and Shuakhevi hospitals.

AGL conducted second round of road safety campaign in affected communities. Training was conducted by the Tbilisi based NGO Partnership for Road Safety targeting school children, teachers and street marshals.

AGL continues to support development of regional infrastructure. Number projects have been implemented in affected villages, project such as road graveling, rehabilitation of drainage and irrigation systems, schools rehabilitations, etc.

Snapshots of 2015:

- 80 school children, 35 teachers, 15 company drivers, 25 street marshals have been trained on traffic safety
- 99 local women, 35 nurses from Khulo and Shuakhevi hospitals have been covered under awareness on healthcare, 280 residents tested on B&C hepatitis, and HIV
- 47 English language teachers have been trained on improvement of English language and pedagogic skills
- 1,189 school children were engaged in different English language activities (essay contest, spelling bee, etc)
- 135 12-th grade students are enrolled in university entrance English language preparation courses
- 8 students continued to receive scholarship, new stream of students from the second semester
- 3 local students from the Tbilisi Technical University undertook internship

- 19 business cases were selected for funding (e.g construction of guest-house, bakery, poultry farm, car workshop, etc.) new businesses have been launched in 8 villages, 49 locals are already involved
- 19 new rural infrastructure development projects were implemented, where 226 locals were recruited on employed on short-term employment

Annexure 1: Environmental and Social Action Plan (ESAP) as per Schedule 12

Environmental and Social Action Plan (ESAP) included in Schedule 12 - Form of Action Plan of the Plan: Please provide a summary of the implementation status of the ESAP using the format below.

No	Action	Source of requirement	Implementation schedule	Target For Successful Implementation / Reporting Requirement	Current Status
1	Report to Lenders on the status of each ESAP requirement and compliance with PRs/PSs/SRs.	ADB SR1 EBRD PR1 IFC PS1	- Semi-annually throughout construction until commissioning - Annually during operation	Submission of reports in format to be mutually agreed, acceptance by Lenders ESHS Reporting Requirement: - Completeness and adequacy of ESHS Report	Second Semi-Annual report issued to Lenders covering period Jan 15 to June 2015
2	Finalize development of the ESHS Management System to include (as required by ESIA, vol. IV, sec.4.2.2): - Register of environmental and social aspects - Register of requirements and conditions in legislation, consents, permits, etc. - Schedule of monitoring program, including required and recommended surveys / inspections/audits (EHS Monitoring Schedule) - Development of Environmental Improvement Plan through development of: - E&S Management and Monitoring procedures	ADB SR1 EBRD PR1 IFC PS1 Best Practice	Prior to commencement of construction works and then prior to commercial operation	- Finalized ESHS with all aspects included. - Lender approval of monitoring program - Monitoring of environmental management (including design change management) and mitigation as per AGL ESHS. Report to Lenders: - Status of ESHS Management System development - Metrics of key performance indicators as set down in AGL ESHS - Summary of audit results of AGL ESHS implementation	Significant EHS occurrences are recorded in the monthly site progress report along KPI's – ongoing KPI's attached is Appendix 5
	- Environmental/Operating				

No	Action	Source of requirement	Implementation schedule	Target For Successful Implementation / Reporting Requirement	Current Status
	procedures - Preparation of action lists and responsibilities - Environmental Operating procedures - Preparation of action lists and responsibilities - Development of training materials and key performance indicators. - Design Change Management procedure				
3	Acquire and comply with all required permits and authorizations	Georgian law ADB SR1 EBRD PR1 IFC PS1	Prior to beginning any activities that require permits or authorizations	- Permits & authorizations received - Reports submitted to authorities as required Report to Lenders: - Compliance status - Report immediately any formal enforcement actions for noncompliance	- AGL has in placed tracker of status of Environmental Permits, which includes information about permits/authorizations to be obtained. AGL Environmental Compliance team is monitoring implementation of Env. Permit requirement to ensure compliance. Moreover, AGL together with OE is conducting regular monitoring of contractors' permits registry. - AGL quarterly submits hydrological monitoring, slope monitoring and vibration monitoring results to the MoE. During reporting period two submissions were made. Also AGL monthly spring water monitoring results and Biodiversity Monitoring Results (6 month report) were submitted to MoE MoE. - Noise, dust and water discharge are being monitored as per the ESMP & CEMP control documents. Result are collated monthly and issued to the Engineer for review – ONGOING

No	Action	Source of requirement	Implementation schedule	Target For Successful Implementation / Reporting Requirement	Current Status
4	Implement ESMP and all associated plans	ADB SR1 EBRD PR1 IFC PS1 Best practice	Throughout construction and operation	- ESMP and all plans implemented - ESHS impacts avoided, minimized, mitigated or compensated Report to Lenders: - Highlights of implementation, including major deviances	
5	Use best efforts to ensure ESIA on Batumi-Akhaltsikhe transmission line is completed in accordance with international best practice and that required mitigation measures are fully implemented.	ADB SR1 EBRD PR1 IFC PS1	Throughout development of ESIA and construction/operation of line	- Transmission line ESIA meets international standards - Construction and operation Accordance with agreed mitigation <i>Report to Lenders:</i> - <i>Status of transmission line ESIA and approval process</i> - <i>Summary of construction and operation</i>	The TL ESIA was uploaded to the WB website in December 2013 as evidence of acceptance The ESIA for the TL was agreed by the GoG on December 2013.
6	Further develop OHS plan to be specific to Adjaristskali project(s) and ensure that the procedures and HSE manuals referred within it are an integral part of health safety and environmental management on site	ADB SR1 EBRD PR2 IFC PS 2 Best Practice	Prior to construction	- OHS plan further developed, adopted, and implemented - Minimum lost time incidents and fatalities - Monitoring of environmental and social management and mitigation as per AGL ESHS Monitoring Schedule <i>Report to Lenders:</i> - <i>Status of updating of OHS</i>	Lost injuries and significant near-miss occurrences are recorded in accordance with the Contractor's and AGL's HSE Plans and elaborated upon on in monthly reports when they happen. The monthly report contains, summaries, causation and trend analysis into negative site activities. Monthly assessments are also made on camp / accommodation arrangements as part of the ESMP along with possible effects of noise and dust on local communities directly or indirectly affected

No	Action	Source of requirement	Implementation schedule	Target For Successful Implementation / Reporting Requirement	Current Status
				<i>plan</i> - Outcome of OHS monitoring as per ESHS Monitoring Schedule. - Summary of OHS issues, including incident and and/or fatalities <i>Enforcement statistics, status of training, etc. Report to cover AGL and contractor workforces</i> - Report to Lenders immediately in case of major accidents	by the Project – Ongoing.
7	Implement Labor Grievance Plan (2012), including grievance mechanism made available to all AGL and contractor workers	ADB SR1 EBRD PR2 IFC PS 2	Throughout construction and operation	- Plan implemented, mechanism made available. - Timely resolution of all grievances <i>Report to Lenders:</i> - Outcome of labor grievance monitoring as per ESHS Monitoring Schedule - Summary of grievances and resolutions	A grievance mechanism has been developed and implemented by AGL and AGE. MM provide monitoring support on behalf of AGL. The AGL information centres record grievance and provide prompt feedback to AGL management and the wider social team that deals with community liaison whilst the Project is live.
8	Review Spoil Management Plan to ensure: - Plan is consistent with ESIA and project design, including estimated spoil quantity	Georgian law ADB SR1 EBRD PR3 IFC PS	Prior to spoil generation	- Site specific spoil management plans developed / approved by AGL - Spoil managed according	AGE has updated Spoil Management Plan third time and AGL submitted it to the MoE for approval on August 31. MoE does not approve the plan and sent comments and recommendations.

No	Action	Source of requirement	Implementation schedule	Target For Successful Implementation / Reporting Requirement	Current Status
	- Specific method statements and risk assessments are completed for each spoil disposal site - Clarity on potential land acquisition - Site specific subsidiary plans to cover management of each individual site during fill and subsequent site reinstatement - Designs sufficient to prevent erosion due to specified flooding events	3 Best Practice		to plan - Monitoring of environmental management and mitigation as per AGL ESHS Monitoring Schedule <i>Report to Lenders:</i> - <i>Status of site specific spoil management plans</i> - <i>Outcome of spoil monitoring as per EHS Monitoring Schedule</i>	AGE will hire local consulting company to updated management plan based on MoEs recommendations and submit again for the approval. AGL is also working to obtain authorization for new spoil disposal areas located in Gurta (Khulo municipality). Relevant consulting company is hired by AGL to develop Spoil Disposal Project for new areas.
9	Complete all necessary additional surveys, reviews and consultations identified in the ESIA and project permit approval conditions. Modify ESMP and associated plans as needed to incorporate findings into environmental and social management.	Georgian law ADB SR1/SR2 EBRD PR3 IFC PS3 Best Practice	Prior to commencement of construction	- Surveys, reviews, consultations completed - ESMP modified as needed <i>Report to Lenders:</i> - <i>Status of additional surveys and impacts of outcomes on ESMP</i>	Surveys are ongoing process and were continued through reporting period: • Regular Ecological surveys and monitoring activities are conducting as required by BAP and ESIA, mainly monitoring of Plants, Mammals birds reptiles, fishes, macro invertebrates and mesohabitat. • As required by Environmental Permit Conditions several monitoring are ongoing: - Spring water monitoring in 20 villages, totally 686 spring water locations. -Landslide monitoring in 30 locations specifically chosen by specialists. -Hydrological monitoring with installed gauging station in three locations approved by the MoE.

No	Action	Source of requirement	Implementation schedule	Target For Successful Implementation / Reporting Requirement	Current Status
					-Biodiversity monitoring according to Biodiversity Monitoring Plan approved by the MoE.
10	Identify mitigation measures for concrete within CEMP11 and ensure appropriate management techniques are employed through the ESMP.	ADB SR1 EBRD PR3 IFC PS 3 Best Practice	Prior to commencement of construction	- Mitigation measures identified - ESMP modified as needed <i>Report to Lenders: - Updated CEMP12</i> - Outcome of CEMP12 implementation monitoring as per EHS Monitoring Schedule	CEMP 11 – water discharge assessment has been delivered by the acquisition of a specific sub-contractor that manages the waste water treatment plan on site. This was setup before the construction phase and will be continuous throughout. Management documents are the CEMP 00,11 and the HSE Plan. CEMP 12 has target specific plans in the Contractors HSE Plan and the Project Emergency & Major Accident Plan.
11	Identify within CEMP09 specific solutions with regards to the need for management of waste at appropriately licensed landfill or other sites.	Georgian law ADB SR1 EBRD PR3 IFC PS 3 Best Practice	Prior to commencement of construction	- Solutions identified - CEMP09 modified <i>Report to Lenders: - Updated CEMP09</i> - Status of site – specific spoil waste disposal site risk assessments and method statements - Outcome of monitoring spoil management practices as per EHS Monitoring Schedule	CEMP 09 is the waste management plan for the Project. Specific risk assessments and a hazardous waste management plan are in place as per CEMP 09. Licenses for hazardous waste transport was obtained from the MoE in January 2014, the Contractor has hazardous waste contract established with a licensed disposal area in Tbilisi.
12	Identify and evaluate risks to community health and safety from construction and operation of the project, develop and implement commensurate preventive measures and plans to	ADB SR1 EBRD PR1 IFC PS1	Prior to creation of potential risks	- Community H&S risk assessment for all project stages - Mitigation / prevention measures developed and implemented - ESMP monitoring and	Project and Community Management Plan agreed in May 2015 Monthly and quarterly reporting are the obligations in the ESMP and ESIA. EHS monitoring outcomes will be further

No	Action	Source of requirement	Implementation schedule	Target For Successful Implementation / Reporting Requirement	Current Status
	address them.			reporting <i>Report to Lenders:</i> - <i>Status of risk identification and mitigation, and planning</i> - <i>Outcome of monitoring of H&S management of risks to the community as per EHS Monitoring Schedule</i>	assessed when full scale construction commences. To date minor construction operation have taken place including camps and work areas. The project also has a community Emergency Response Plan that has been agreed by the GoG.
13	Develop and enforce a Code of Conduct for Security Personnel	ADB SR1 EBRD PR4 IFC PS1 Best practice	Prior to commencement of construction	Code of Conduct developed and enforced <i>Report to Lenders:</i> - <i>Status of Code of Conduct development</i> - <i>Outcome of monitoring of effectiveness of Code of Conduct for Security Personnel as per EHS Schedule</i>	Code of Conduct (CoC) developed and implemented by AGL and AGE. Community Liaison Officers are monitoring effectiveness of The CoC which is displayed in all working camps.
14	Develop and enforce Worker Code of Conduct in accordance with the Worker Behaviour Guidelines	ADB SR1 EBRD PR4 IFC PS4 Best Practice	Prior to commencement of the construction phase	- Code of Conduct developed and enforced <i>Report to Lenders:</i> - <i>Status of Code of Conduct Development – Outcome of monitoring of effectiveness of Worker Code of Conduct as per ESHS Schedule</i>	To support the Code of Conduct, the Project has Policies covering Anti-Corruption and Misconduct. Issued to Lender's as part of the May 2013 DD process.
15	Implement the LALRP, including timely disclosure of up-to-date land acquisition and resettlement documentation, summary of LALRP and	ADB SR2 EBRD PR5 IFC PS5	Throughout land acquisition process	- LALRP implemented - Up-to-date land acquisition and resettlement documentation available	AGL updated Addenda to LALRP and Detailed LRP. Both documents are shared with lenders. Updated LALRP covers information on land acquisition for the Ghorjomi bridge and the related road

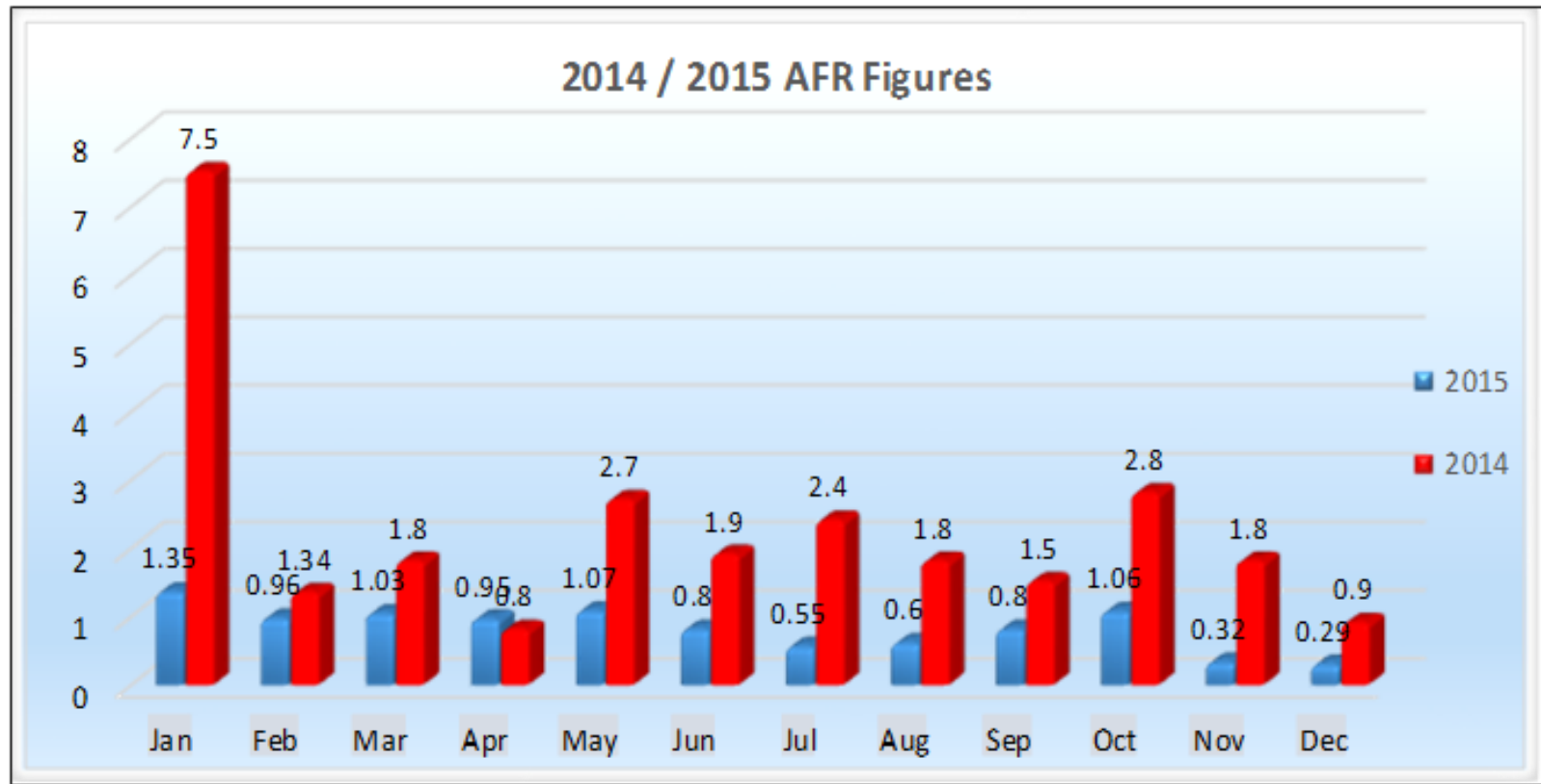
No	Action	Source of requirement	Implementation schedule	Target For Successful Implementation / Reporting Requirement	Current Status
	information on progress (e.g. monthly Information Letters, booklets, brochures, etc.)			on AGL's website and locally. Report to Lenders: - Status of acquisition - Summary of disclosures	section. All land have been acquired and compensation for land and trees been paid out. Landowners/users affected by the Ghorjomi bridge are included the in the livelihood restoration activities. As for 35kV Transmission Line. there is still limited information to the land required, technical team is working closely with the AGL land team to select the option for the routing. Once all information is obtained a separate Addendum will be shared. Diakonidzeebi Weir is still under consideration. if the decision to construction is taken, a separate Addendum will be prepared and shared. AGL is implementing successfully Detailed LRP. All affected landowners have be interviewed to map their interests and form groups accordingly. AGL conducted mid-term livelihood survey to assess to what extend affected households managed to restore the livelihood. Once all land acquisition process is finished, AGL intends to carry out the comprehensive survey. Questionnaires and methods of survey will be agreed by AGL and lenders.
16	Implement the BAP, including: - developing and implementing	Georgian law ADB	- Develop schedule: Prior to construction	- BAP implemented - ESMP monitoring and	Local NGO's perform the monitoring on the BAP and ESMP specification. The

No	Action	Source of requirement	Implementation schedule	Target For Successful Implementation / Reporting Requirement	Current Status
	detailed monitoring schedule for evaluation and reporting of ecological impacts and recognizing findings of additional surveys undertaken - monitoring flow upstream and downstream of all dams to verify required minimum flows are met - Ecological assessments as performed to verify flows are adequate to preserve biodiversity, or to redefine minimum flows	SR1 EBRD PR6 IFC PS4, 6	- Implement monitoring schedule: as specified in BAP throughout during construction and operation - Monitor flow: throughout operation - Ecological assessments: as per BAP	reporting Report to Lenders: - Status of schedule development - Outcome of ecological monitoring as per Monitoring Schedule - Summary of minimum flows against requirements - Summary of ecological assessments, including need for adjustments in minimum flows.	Contractor's social team along with AGL's social team provide the physical monitoring in line with the ESMP requirements – ongoing.
17	Conduct additional surveys to determine presence of graveyards, and if needed work with communities to minimize impacts	ADB SR1/SR2 EBRD PR8 IFC PS8	- Survey of area: prior to disturbance of the area - Consultation with communities to minimize impact: prior to disturbance of graves	- Surveys conducted - Consultations held and actions agreed Report to Lenders: - Summary of surveys and actions taken (consultations, etc.) - Outcome of monitoring of graveyard protection as per EHS Monitoring Schedule	As stated in section 9.
18	Update CEMP01, Chance Finds Procedure, to call for archaeologist to be on site as needed to verify archaeological finds, provide advice to a nominated AGL representative, and liaise with	Georgian law ADB SR1 EBRD PR1 IFC PS1	Prior to construction	- Updated Chance Finds Procedure Report to Lenders: Status of ADB SR1 EBRD PR4 - IFC PS1 updated Chance Finds Procedure	This task was completed in late 2013. An extensive assessment was completed of the work and camp areas for Archaeology or areas of special interest.

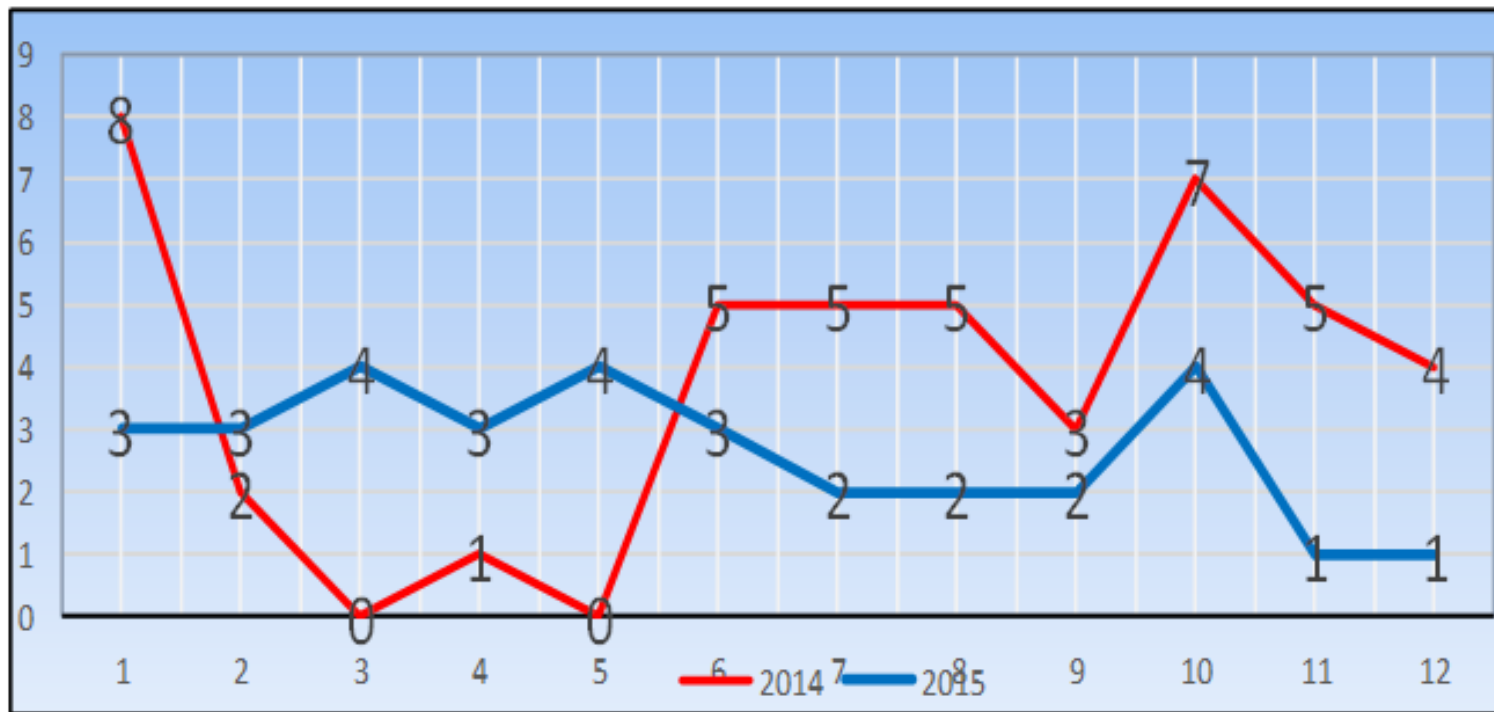
No	Action	Source of requirement	Implementation schedule	Target For Successful Implementation / Reporting Requirement	Current Status
	relevant authorities.			- Outcome of chance finds procedure implementation, monitored per EHS Monitoring Schedule	
19	Implement Stakeholder Engagement Plan	ADB SR 1 EBRD PR10 IFC PS1	Throughout construction and operation	- SEP implemented Report to Lenders: - Summary of stakeholder engagement	AGL, through its monitoring process has recognised areas for improvement with SEP delivery. AGL has to observe the obligation set forth to reach full compliance.
20	Evaluate and update SEP to improve/ refine stakeholder list,	ADB SR1 EBRD PR10	Evaluation and update: annually during	- SEP evaluated and updated if needed	AGL updated and submitted SEP in mid-July and further updates in November. Lenders are in possession of this document.
21	Communication methods, media, etc.	IFC PS1	construction, biennially thereafter	Report to Lenders: - Updated SEP	AGL is actively collaborated with the major media outlets in both municipalities. AGL has strived to effectively share information with media organizations such as the Ajara TV and TV 25 television stations and the Adjara, Khulo, and Shuakhevi regional newspapers. In 2015 was also very active with respect to AGL's

Annexure 2: HSE Performance Indicators

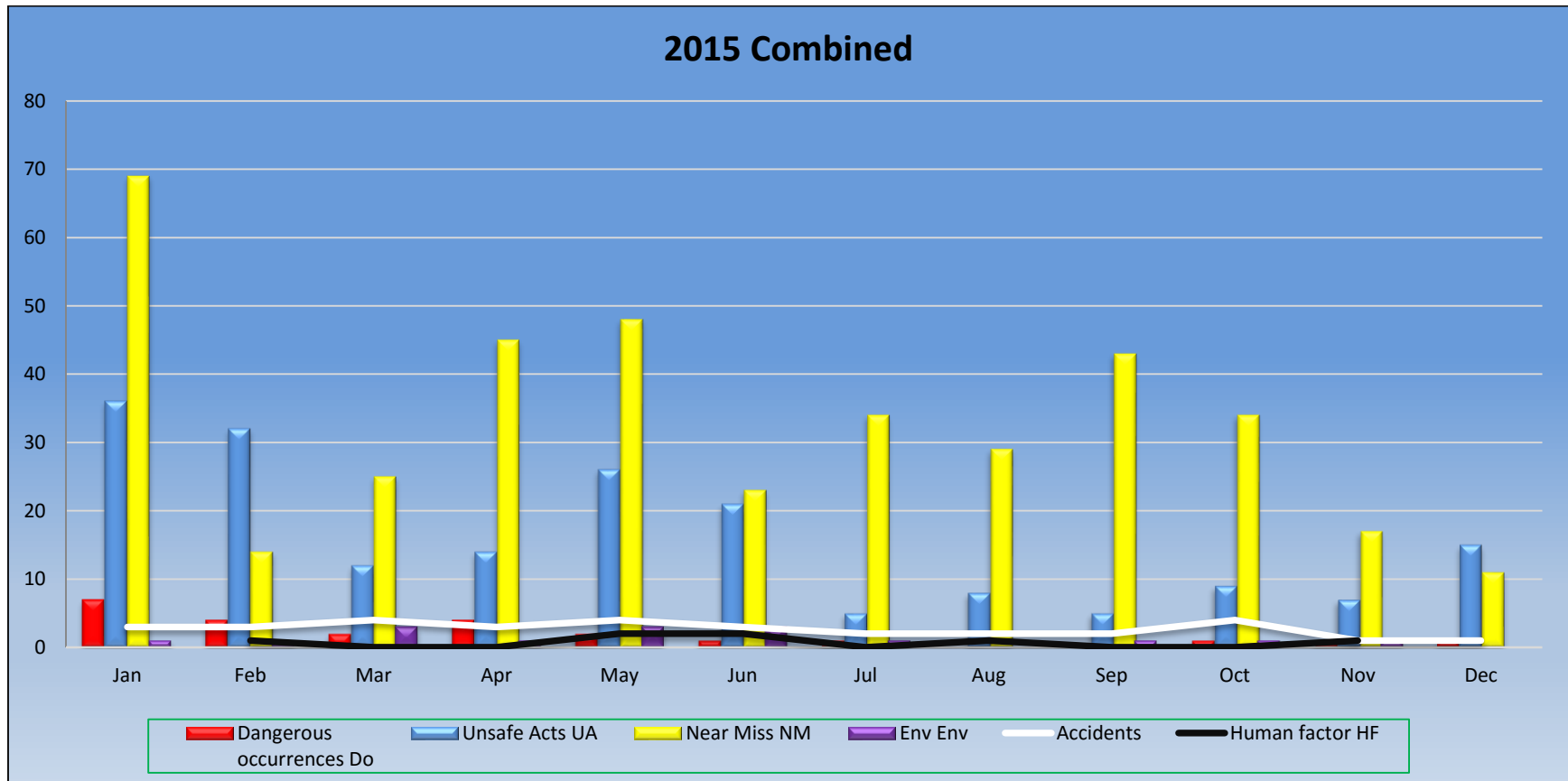
Annexure 2 - HSE Key Performance Indicators 2015



Accident Trendline 2014 / 2015



Combined



Annexure 3: Dust, Noise & Water Sample Test Results



Selin Lab

SELİN ÖLÇÜM LABORATUVAR HİZMETLERİ
BİLİŞİM MÜH.MÜŞ. İNŞ. SAN. VE TİC. A.Ş.

Müşterinin Adı/Adresi:

Customer Name/Address

AGE Batum LTD - Shuakhevi HES
BATUM/Gogebashvili N:60

Müşterinin

Telefonu/Faksı:

Customer Phone/Fax

+995 422 21 22 05/06/07
+995 422 21 22 05/06/07

İstek Numarası:

Order No.

15-001/IX

Numunenin Adı ve Tarifı:

Name And Identity Of The
Test Item

Dust (PM10) Measurement

Deneyin Yapıldığı Tarih:

Date Of Test

11/12/2015 – 12/12/2015 – 13/12/2015

Raporun Numarası ve

Tarihi:

Number And Date Of The
Report

15-İMİ-001/IX-1 – 18/12/2015



TÜRKAK
TÜRK AKREDİTASYON KURUMU
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SELİN ÖLÇÜM LABORATUVAR HİZMETLERİ
BİLİŞİM MÜH. MÜŞ. İNŞ. SAN. VE TİC. A.Ş.

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AB-0237-T
15-İMI-001/IX-1
18/12/2015

Deney Raporu / Test Report

Müşterinin adı/adresi: AGE Batum LTD - Shuakhevi HES
Customer name/address BATUM/Gogebashvili N:60

Müşterinin telefonu/faksı: +995 422 21 22 05/06/07
Customer phone/fax +995 422 21 22 05/06/07

İstek Numarası: 15-001/IX
Order No.

Numunenin adı ve tarifi: Dust (PM10) Measurement
Name and identity of the test item

Numunenin kabul tarihi ve no: 15/12/2015 - 151213-T-1
The date and number of receipt of the test item

Açıklamalar: -
Remarks

Deneyin yapıldığı tarih: 11/12/2015 – 12/12/2015 – 13/12/2015
Date of test

Raporun sayfa sayısı: 19
Number of pages of the Report

Türk Akreditasyon Kurumu (TÜRKAK) deney raporlarının tanınması konusunda Avrupa Akreditasyon Birliği (EA) ve Uluslar arası Laboratuvar Akreditasyon Birliği (ILAC) ile karşılıklı tanınma antlaşması imzalamıştır.

The Turkish Accreditation Agency (TÜRKAK) is signatory to the multilateral agreements of the European co-operation for the accreditation (EA) and of the International Laboratory Accreditation (ILAC) for the Mutual recognition of test reports.

Deney ve/veya ölçüm sonuçları, genişletilmiş ölçüm belirsizlikleri (olması halinde) ve deney metotları bu sertifikanın tamamlayıcı kısmı olan takip eden sayfalarda verilmiştir.

The test and/or measurement results, the uncertainties (if applicable) with confidence probability and test methods are given on the following pages which are part of this report.

Mühür Seal	Tarih Date	Deneyi Yapan Test Done by	Analizi Yapan Analyzed by	Raporu Hazırlayan Report Prepared by	Onay Approved by
18/12/2015		Murat DİNÇ Measurement Responsible	Ebru ŞAHİN ASLAN Analysis Responsible	İsmail ARSLAN Quality Management Representative	Ersan ÖZKİŞİ Laboratory Technical Manager

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SKF-SLB-01/39 17.04.2013/ Rev:04

Accreditation No: AB-0237-T

15-İMI-001/IX-1 – 18/12/2015

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A. INTRODUCTION

This report was prepared as a result of the measurements performed in the explicit address mentioned below;

Date of the Measurement : 11.12.2015 – 12.12.2015 – 13.12.2015

Location of the Measurement : Shuakhevi HES

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B. INFORMATION ABOUT THE FACILITY

The construction phase of the Shuakhevi HEPP Project, located in Adjaristsqali River, Georgia, is carried out by AGE Batum LTD.

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C. EMISSION MEASUREMENT REPORT

i. Introduction

The aim of the Regulation of Evaluation and Management of Air Quality is to determine and develop air quality targets to prevent or mitigate the harmful effects of air pollution on human health and environment, to evaluate the air quality based on determined methods and criteria, to conserve the present situation in the regions where the air quality is well and to increase the air quality in other situations, to collect enough information related to air quality and to provide public information via warning thresholds.

The aim of the Regulation of Control of the Air Pollution Due To Industrial Facilities is to control the emissions in the form of soot, smoke, dust, gas, vapor and aerosol due to industrial and energy production facilities; to protect human beings and their environment from the dangers caused by the pollutions in the air receiving environments; to eliminate the negative effects causing significant harms to neighborly relations and public and to prevent these effects.

For the mentioned Hydroelectric Power Plant (HEPP) construction, to monitor the PM10 (dust) emissions, PM10 (dust) measurements were performed and the results are presented in this report.

i. Measurement Methods

The measurements were performed according to the standard given below.

EPA 40 CFR PART 50 National Ambient Air Quality Standards for Particulate Matter; Final Rule

ii. General Principles

Correct emission results depend both on applying a correct measurement technique and general principles of the measurement.

Our company provides correct and trustable results by the on-site measurements, preparation in the laboratory and checks made before measurement. Therefore emission analysis is made in three stages.

- **Preparation**

Before measurement, devices are checked by authorized personnel under the supervision of Technical Manager of the Laboratory before they are moved out of the laboratory and they are delivered to measurement team by Technical Manager of the Laboratory

- **Determination of the Measurement Points**

When selecting the measurement points, integrity in terms of macro environmental scale (type of the experiment location) and micro environmental scale (area surrounding directly the station) is taken into account.

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- **Measurement and Analysis Process**

Device is designed for the sampling of the particulate matter (PM10) in the air in the environment. Determination of the PM10 amount was made according to EPA 40 CFR PART 50 standard. In the sampling process dust is retained on the filters and determined gravimetrically in the laboratory condition.

When selecting the measurement points, EPA 40 CFR PART 50 norms were applied and the nearest areas to the Project area and points that might be affected by the activity were selected. Samples were taken from sampling locations according to sampling technique mentioned in the EPA 40 CFR PART 50 and sampling representing the whole was made and measurement was performed.

ii. Measurement System

During measurements Dust Sampling Device with Serial No. of E0745160 was used. Device is designed for the sampling of the particulate matter (PM10) in the air in the environment.

iii. Definitions and Explanations

PM 10: in EN 12341, PM10 is defined as a particulate matter that passes through with 50% efficiency from 10 µm aerodynamic diameter pervious input

iv. Measurement Results

Measurements were performed in three different points and the results of these measurements are given below.

Table 1: Measurement Points.

Source Code	Measurement Date	Source of Emission	Dust(PM10)
T1	11.12.2015	HES (Concrete Plant and Crusher)-Receiver Point 38 263305 D 4613165 K	X
T2	12.12.2015	Chanckalo Adit - Receiver Point 38 268971 D 4613117 K	X
T3	13.12.2015	Skhalta Outlet-Didajhara Crusher-Receiver Point 38 280151 D 4614458 K	X

$$\text{PM 10 Konsantrasyonu (mg/m}^3\text{)} = \frac{D}{A} \quad \text{PM 10 Konsantrasyonu (mg/Nm}^3\text{)} = \frac{D}{A} \times \frac{273^\circ\text{C} + B}{273^\circ\text{C}} \times \frac{101,3 \text{ kPa}}{C}$$

Table 2: Dust (PM10) Measurement Results

	A	B	C	D	E	F
Source Code	Sample Volume (m ³)	Ambient Temperature (°C)	Ambient Pressure (kPa)	Mass (µg)	PM 10 (µg/m ³)	PM 10 (µg/Nm ³)
T1	23,8205	7,81	93,411	590,0000	24,76858	27,62883
T2	23,8450	4,15	93,378	390,0000	16,35563	18,01293
T3	23,8492	3,51	93,374	460,0000	19,28786	21,19413

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v. Evaluation of Measurement Results

The comparison of the mean measurement results with the limit values are given below.

Table 3: The comparison of the mean measurement results with the limit values

Source Code	Measurement Date	Measuring Results PM 10 ($\mu\text{g}/\text{Nm}^3$)	Regulation of Evaluation and Management of Air Quality	The Law of Georgia on Protection of Atmospheric Air	WHO Ambient Air Quality Guidelines (and IFC General Work HS Guidelines)
T1	11.12.2015	27,62883	50 $\mu\text{g}/\text{m}^3$	150 $\mu\text{g}/\text{m}^3$	50 $\mu\text{g}/\text{m}^3$
T2	12.12.2015	18,01293	50 $\mu\text{g}/\text{m}^3$	150 $\mu\text{g}/\text{m}^3$	50 $\mu\text{g}/\text{m}^3$
T3	13.12.2015	21,19413	50 $\mu\text{g}/\text{m}^3$	150 $\mu\text{g}/\text{m}^3$	50 $\mu\text{g}/\text{m}^3$

When we look at the Table 3, it is seen that the measurement results are below the limit values given in related regulations.

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D. APPENDICES

APP-1 : LABORATORY DOCUMENTS

APP-2 : CALIBRATION CERTIFICATE

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APP-1 LABORATORY DOCUMENTS

This report is only valid for the **DUST (PM10)** measurements performed on **11.12.2015 – 12.12.2015 – 13.12.2015** in the scope of **AGE Batum LTD – Shuakhevi HEPP Project** and **cannot be copied without the written permission of SELIN Measurement Laboratory Co. Inc.** Reports without sign and seal are invalid. Measurement results are only related to operation conditions during measurement. **Our accreditation is restricted with the scope of the experiment methods in our scope. Competence of the opinions and interpretations stated except this is not in the scope of the accreditation. This report cannot be used for official procedures related to environmental legislation.**

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TÜRK AKREDİTASYON KURUMU

AKREDİTASYON SERTİFİKASI

Deney Laboratuvarı olarak faaliyet gösteren,

SELİN ÖLÇÜM LABORATUVAR HİZMETLERİ
Bilişim Müşavirlik İnşaat San Ve Tic A. Ş.
Deney Laboratuvarı
1324.Cadde Özlem Apt. No:30/C Öveçler
06450 ANKARA / TÜRKİYE

TÜRKAK tarafından yapılan denetim sonucunda TS EN ISO/IEC 17025:2012 Standardına göre Ek'te yer alan kapsamlarda akredite edilmiştir.

Akreditasyon No : AB-0237-T

Akreditasyon Tarihi : 31 Temmuz 2009

Revizyon Tarihi / No : 10 Nisan 2015 / 06

Bu Sertifika, yukarıda açık adı ve adresi yazılı Kuruluşun TS EN ISO/IEC 17025:2012 Standardına, ilgili Yönetmelik ve Tebliğlere uygunluğunu sürdürmesi halinde , **27 Kasım 2017** tarihine kadar geçerlidir.




Dr. H. İbrahim ÇETİN
Genel Sekreter

F701-040

+90 312 410 82 00 - www.turkak.org.tr

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9/19

Accreditation No: AB-0237-T

15-İMİ-001/IX-1 – 18/12/2015

Akreditasyon Sertifikası Eki (Sayfa 1/6)

Akreditasyon Kapsamı

 Test TS EN ISO IEC 17025 AB-0237-T	SELİN ÖLÇÜM LABORATUVAR HİZMETLERİ Bilişim Müşavirlik İnşaat San Ve Tic A. Ş. Akreditasyon No: AB-0237-T Revizyon No: 06 Tarih: 10 Nisan 2015	
	Deney Laboratuvarı Adresi : 1324.Cadde Özlem Apt. No:30/C Öveçler 06450 ANKARA / TÜRKİYE	Tel : 0 312 472 94 35 Faks : 0 312 481 33 01 E-Posta : selinlab@gmail.com Website : www.selinlab.com.tr
Deneyi Yapılan Matzemeler / Ürünler	Deney Adı	Deney Metodu (Ulusal, Uluslararası standartlar, işletme içi metodlar)
Gürültü	Çevresel gürültü düzeyinin tespiti/ L_{Aeq} , L_{max} , L_1 , L_{1eqT} , L_{K1} , L_{day} , L_{den} , $L_{evening}$, L_{night} , L_{n1} , L_{dn} , L_{CE} , L_{NT} , L_{fmax} , L_{Cenmax} , L_{corr} , R , L_{PT}	TS 9315 ISO 1996-1 ve TS 9315 ISO 1996-1/T1 TS ISO 1996-2 ve TS ISO 1996-2
Akustik	Çoklu gürültü kaynağına sahip sanayi tesislerinde yapılan ses basıncı düzeyi ölçümlerinden ses gücü düzeyinin tayini L_p , L_p^* , $L_{eq,T}$, h , ΔL_s , ΔL_r , ΔL_{tr} , L_{w}	TS ISO 8297
	Gürültü kaynaklarının mühendislik metodu kullanılarak yapılan ses basıncı düzeyi ölçümlerinden ses gücü düzeyinin tayini/ L_p , $L_{eq,T}$, K_u , $L'p$, $L''p$, L_{AP} , L_w , ΔL	TS EN ISO 3744
	Gürültü kaynaklarının gözlem metodu kullanılarak yapılan ses basıncı düzeyi ölçümlerinden ses gücü düzeyinin tayini L_p , $L_{eq,T}$, K_u , K_v , $L'p$, $L''p$, L_{AP} , L_w , ΔL	TS EN ISO 3746
	Yerleşim alanlarında sesin açık alanda yayılırken azaltım faktörlerinin ve çevresel gürültü düzeyinin tespiti/ $\Delta L(f)$, f_{10} , f_{10} , f_{10} , α , α_{10} , α_{10} , α_{10} , N , L_{AT} , L_{RT} , L_{RT} (DW), D_c , A_{div} , A_{atm} , A_{gr} , A_{bar} , A_{mix} , L_{AT} (LT)	TS ISO 9613-1 TS ISO 9613-2
	Demiryolu ulaşım araçlarının ses gücü düzeyinin ve demiryolu gürültüsünün alansal dağılımının hesaplanması E , L_E , $L_{E^{as}}$, $L_{E^{as}}$, C_{bajm} , L_{den} , L_{day} , L_{Aeq} , L , E_s , C_{yanama} , $D_{mesafey}$, D_{havay} , D_{toprak} , D_{meteo}	Hollanda ulusal hesaplama yöntemi RMR SRM II

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Akreditasyon Sertifikası Eki (Sayfa 2/6)

Akreditasyon Kapsamı

 T.C. EN ISO 15189 AB-0237-T	SELİN ÖLÇÜM LABORATUVAR HİZMETLERİ Bilişim Müşavirlik İnşaat San Ve Tic A. Ş. Akreditasyon No: AB-0237-T Revizyon No: 06 Tarih: 10 Nisan 2015	
Deneyi Yapılan Malzemeler / Ürünler	Deney Adı	Deney Metodu (Ulusal, Uluslararası standartlar, işletme içi metodlar)
(Akustik Devam)	Karayolu ulaşım araçlarının ses gücü düzeyinin ve karayolu gürültünün alansal dağılımında hesaplanması/ L_{den} , L_{day} , $L_{evening}$, L_{night} , $L_{longterm}$, Leq , L , L_w , A_{div} , A_{stm} , $A_{grd,f}$, $A_{ul,f}$	Fransız ulusal hesaplama yöntemi NMPB - 96 ve Fransız standardı XPS 31-133
	Yapıların akustik performansının değerlendirilmesi	TS EN 12354-4
	Yapılarda ve yapı elemanlarında ses yalıtımının ölçülmesi/ R' , A , L_p , L_v , L_n , W_i , D_{nT}	TS ISO 140-4
Titreşim	Madencilik faaliyetleri sonucunda oluşan hava şoku ve yer titreşiminin ölçülmesi/ a , V , P_c	TS 10354
	Makine ve Ekipmanlardan Kaynaklanan Mekanik Titreşim Sonucu Oluşan Yapı Titreşiminin Ölçülmesi ve Binalara Etkilerinin Değerlendirilmesi/ tr , a , V	TS ISO 4866
	Gaz Türbini Setlerinin dönmeyen parçalarında titreşimin ölçülmesi ve değerlendirilmesi V_{rms}	ISO 10816-4
	Hidroelektrik Santrallerde Dönmeyen Parçalarda Titreşim Ölçümleriyle Makinelerin Değerlendirilmesi V_{rms}	ISO 10816-5
İSG (Gürültü)	Kişilerin maruz kaldığı gürültü düzeyinin ölçülmesi ve işitme kayıplarının tespiti L_{pA} , $E_{A,T}$, $L_{Aeq,T}$, $L_{EX,h}$, H , N , H'	TS 2607 ISO 1999
İSG (Titreşim)	Elle İletilen Titreşimin Ölçülmesi ve Değerlendirilmesi- a_{hw} , a_{hvx} , a_{hwy} , a_{hwz} , a_{hry} , a_{hrx} (eşit, 8 saat), $A(8)$, D_y	TS EN ISO 5349-1



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Akreditasyon Sertifikası Eki (Sayfa 3/6)

Akreditasyon Kapsamı

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Deneyi Yapılan Malzemeler / Ürünler	Deney Adı	Deney Metodu (Ulusal, Uluslararası standartlar, işletme içi metodlar)
(İSG (Titreşim) Devam)	Elden Vücuda İletilen Titreşimin Ölçülmesi ve Değerlendirilmesi - $\dot{a}_{hw}$, $\dot{a}_{hv}$, $\dot{a}_{hwz}$, $\dot{a}_{hvw}$, $\dot{a}_{hwz}$, $A(8)$, $Ai(8)$	TS EN ISO 5349-2
	Titreşim - Mekanik Titreşim ve Şok - Tüm Vücut Titreşime Maruz Kalma Değerlendirilmesi / $\dot{a}_x$, $\dot{a}_y$, $\dot{a}_z$	TS ISO 2631-1
	Hareketli Makinelerde Titreşim Düzeyinin Tespiti / $\dot{a}_w$, $\dot{a}_{hw}$, $\dot{a}_{hwz}$, $\dot{a}_{hwy}$, $\dot{a}_{hwz}$, $\dot{a}_{wz}$	TS EN 1032+A1
Çalışma Ortamında Maruziyet	Kimyasal Madde Ölçümleri ve Değerlendirmesi	ASTMD 4490-96 TS EN 689
	Optik yansıma ve gravimetrik yöntem ile toz tayini	MDHS 14/3
	Aydınlatma düzeyinin tespiti/Aydınlatma seviyesi	COHSR-928-1-IPG-039
	Termal Konforun tespiti, çalışma şartlarının insanlar üzerindeki etkisinin belirlenmesi/ Hava akım hızı, küresel sıcaklık, ortam sıcaklığı, bağıl nem, yaş hazne sıcaklığı ve küresel sıcaklık	TS EN ISO 7730
	Termal Konforun tespiti ve soğuk çalışma şartlarının insanlar üzerindeki etkisinin belirlenmesi/ Hava akım hızı, küresel sıcaklık, ortam sıcaklığı, bağıl nem, yaş hazne sıcaklığı ve küresel sıcaklık	TS EN 27243
	İşyeri ortam havasında aktif karbon tüplerine VOC numunesinin alınması ve gaz kromatografi yöntemi ile VOC tayini /VOC	TS ISO 16200-1



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Akreditasyon Sertifikası Eki (Sayfa 4/6)

Akreditasyon Kapsamı

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	Akreditasyon No: AB-0237-T Revizyon No: 06 Tarih: 10 Nisan 2015

Deneyi Yapılan Malzemeler / Ürünler	Deney Adı	Deney Metodu (Ulusal, Uluslararası standartlar, işletme içi metodlar)
Bacagazı (Emisyon) (TS CEN/TS 15675 ve TS EN 15259 şartlarına uygun)	Sabit Kaynak Emisyonlarında Elektrokimyasal Hücre Metodu ile SO ₂ Tayini	TS ISO 7935
	Sabit Kaynak Emisyonlarında Elektrokimyasal Hücre Metodu ile CO ₂ , O ₂ , CO	TS ISO 12039
	Sabit Kaynak Emisyonlarında Elektrokimyasal Hücre Metodu ile NO _x (NO+NO ₂) Tayini	EPA CTM 022
	Nokta Kaynak Emisyonları - Borulardaki Gaz Akışlarının Hız Ve Debisinin Ölçülmesi	TS ISO 10780
	Baca Gazları - Destile Yakıtların Yanmasıyla Meydana -Gelen Duman Yoğunluğu (Islilik) Tayini- Bacharach Yöntemiyle	TS 9503
	Sabit Kaynak Emisyonlarında Nem İçeriğinin Tayini	EPA Metot 4
	Nem Probu ile Nem Tayini (≤ 180°C baca sıcaklığı için)	İşletme İçi Metot (Baca Sıcaklığı <180°C)
	Sabit Kaynak Emisyonları-Tanecikli Maddenin Kütle Derişiminin Elle Tayini- Referans metot	TS ISO 9096
	Sabit Kaynak Emisyonları-Tozun Düşük Aralıktaki Kütle Derişiminin Tayini-Bölüm 1: Manuel Gravimetrik Metot- Referans metot	TS EN 13284-1
	Sabit Kaynak Emisyonlarında Toz Emisyon Miktarının Tayini (Baca dışı örnekleme)	EPA Metot 5



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Akreditasyon Sertifikası Eki (Sayfa 5/6)

Akreditasyon Kapsamı

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Deneyi Yapılan Malzemeler / Ürünler	Deney Adı	Deney Metodu (Ulusal, Uluslararası standartlar, işletme içi metodlar)
(Bacagazi (Emisyon) (TS CEN/TS 15675 ve TS EN 15259 şartlarına uygun) Devam)	Sabit Kaynak Emisyonlarında Toz Emisyon Miktarının Tayini (Baca içi örnekleme)	EPA Metot 17
	Sabit Kaynak Emisyonlarında Toplam Flor Miktarının Tayini-SPANDS Metodu	EPA Metot 13 A
	Sabit Kaynak Emisyonları- HF örnekleme ve gaz halindeki florürlerin kütle konsantrasyonunun tayini- Referans metot	ISO/FDIS 15713
	Sabit Kaynak Emisyonları- HCL olarak tanımlanan gaz halindeki klorürlerin kütle konsantrasyonunun tayini- Standard Referans Yöntem	TS EN 1911
	Sabit Kaynak Emisyonları- Gaz Halindeki Münferit Organik Bileşiklerin Kütle Derişimlerinin Tayini-Aktif Karbon Ve Çözücü Desorpsiyonu Metodu	TS EN 13649
	Sabit Kaynak Emisyonları- Baca Gazlarında Düşük Derişimlerde Bulunan Gaz Halindeki Toplam Organik Karbonun Kütle Derişiminin Tayini- Alev İyonlaştırma Detektörü Kullanılan Sürekli Metot- Referans metod	TS EN 12619
Hava Kalitesi (Emisyon) Ölçümleri	Hava Kalitesi - Askıda Katı Maddelerin PM10 Kesrinin Tayini	EPA 40 CFR Part 50 Appendix J ve M



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Deneyi Yapılan Malzemeler / Ürünler	Deney Adı	Deney Metodu (Ulusal, Uluslararası standartlar, işletme içi metodlar)
(Hava Kalitesi (İmisyon) Ölçümleri Devam)	Hava Kalitesi - Askıda Katı Maddelerin PM10 Kesrinin Tayini - Ölçme Yöntemlerinin Referans Eşdeğerliğini Göstermek İçin Saha Deney İşlemi Ve Referans Metodu	TS EN 12341
	Hava Kirliliği Ölçme Metotları Yönlendirilebilir Çökelti Ölçme Cihazı Kurma Ve Çalıştırma Metodu- Çöken Toz Tayini	TS 2342

KAPSAM SONU




Dr. H. İbrahim ÇETİN
Genel Sekreter

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APP -2 CALIBRATION CERTIFICATE

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 AVL Kalibrasyon Laboratuvarı	TÜRKAK TÜRK AKREDİTASYON KURUMU TURKISH ACCREDITATION AGENCY tarafından akredite edilmiştir.	 Kalibrasyon TS EN ISO/IEC 17025 AB-0089-K
AVL AKUSTİK VİBRASYON KALİBRASYON LABORATUVARI İvedik O.S.B. 1385. Sk. No: 10. OSTİM / ANKARA		AB-0089-K 2014-0712 07-2014
Kalibrasyon Sertifikası Calibration Certificate		
Cihazın Sahibi Customer Name	: SELİN ÖLÇÜM LAB. HİZM. BİL. MÜH. MÜŞ. İNŞ. SAN. VE TİC. A.Ş. Çetinemeç Bulvarı 1324. Cadde No.30/C Öveçler Dikmen / ANKARA	
İstek Numarası Order No.	: TEK-2014-315	
Makine / Cihaz Instrument / Device	: PM10 Toz Örneklemme Cihazı PM10 Dust Sampling Device	
İmalatçı Manufacturer	: Tecora	
Tip Type	: Echo PM	
Seri Numarası Serial number	: E0745160	
Kalibrasyon Tarihi Date of calibration	: 11.7.2014	
Sertifika Sayfa Sayısı Number of pages of the certificate	: 3	
Bu kalibrasyon sertifikası, Uluslararası Birimler Sisteminde (SI) tanımlanmış birimleri realize eden ulusal ölçüm standartlarına izlenebilirliği belgeler. This calibration certificate documents the traceability to national standards, which realize the unit of measurement according to the International System of Units (SI). Türk Akreditasyon Kurumu (TÜRKAK) kalibrasyon sertifikalarının tanınması konusunda Avrupa Akreditasyon Birliği (EA) ve Uluslararası Laboratuvar Akreditasyon Birliği (ILAC) ile karşılıklı tanınma antlaşmasını imzalamıştır. The Turkish Accreditation Agency (TÜRKAK) is signatory to the multilateral agreements of the European co-operation for the Accreditation (EA) and of the International Laboratory Accreditation (ILAC) for the Mutual recognition of calibration certificates. Ölçüm sonuçları, genişletilmiş ölçüm belirsizlikleri ve kalibrasyon metodları bu sertifikanın tamamlayıcı kısmı olan takip eden sayfalarda verilmiştir. The measurements, the uncertainties with confidence probability and calibration methods are given on the following pages which are part of this certificate.		
Mühür Seal 	Tarih Date 11.7.2014	Kalibrasyonu Yapan Calibrated by  Veli Baydır
		Laboratuvar Müdürü Head of the Calibration Laboratory  Younes NEVAYE SHIRAZI

Bu sertifika, laboratuvarın yazılı izni olmadan kısmen kopyalanıp çoğaltılamaz.

İmzasız ve mühürlü sertifikalar geçersizdir.

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AVL AKUSTİK VİBRASYON
KALİBRASYON LABORATUVARI

AB-0069-K

2014-0712

07-2014

1. Cihaza Ait Bilgiler

Device to be Calibrated

Cihazın Adı : PM10 Toz Örneklemme Cihazı
Name of the Instrument : PM10 Dust Sampling Device
İmalatçısı : Tecora
Manufacturer :
Seri Numarası : E0745160
Serial Number :
Bölüntüsü : 0,001
Scale Division :
Tipi : Echo PM
Type :

2. Cihazın Laboratuvara Kabul Tarihi

Date of Receipt of Device

: 11.7.2014

3. Kalibrasyon Metodu

Calibration Method

Test cihazının kalibrasyonu karşılaştırma metodu ile yapılmıştır. PR.LBBR.201 prosedürü kullanılmıştır.

4. Çevresel Şartlar

Environmental Conditions

4.1. Referans Cihaz Verileri

Data From Reference Instrument

Ortam Sıcaklığı : 23,4 ± 3 °C
Ambient Temperature :
Bağıl Nem : 50,3 ± 25 %
Relative Humidity :
Ortam Basıncı : 904 ± 1 hPa
Ambient Pressure :

4.2. Test Edilen Cihaz Verileri

Data From Instrument Under Test

Ortam Sıcaklığı : 24,53 °C
Ambient Temperature :
Ortam Basıncı : 903,38 hPa
Ambient Pressure :

4.3. Test Edilen Cihazın

Instrument Under Test

Hata Miktarı

Deviation

Belirsizlik

Uncertainty

Ortam Sıcaklığı : 1,13 °C ± 0,3 °C
Ambient Temperature :
Ortam Basıncı : -0,62 hPa ± 1 hPa
Ambient Pressure :

PR.LBBR.201



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AB-0088-K

2014-0712

07-2014

5. Kalibrasyonda Kullanılan Referans Cihazlar

Reference Equipments Used During Calibration

Cihaz Device	İmalatçı Manufacturer	Seri No Serial No	Tipi Type	Sertifika No Certificate No	İzlenebilirlik Traceability
Akış Kalibratörü	Sierra	132548	SL-500-44	12861	SIERRA
Termo - Hygrometre	KIMO	7122852	KH100	4.02209	UMS

6. Kalibrasyon Sonuçları

Calibration Results

Standart Şartlarda Ölçülen Debi Measured Flow in Standard Conditions		Akış Sapması Flow Deviation		Ölçüm Belirsizliği Calibration Uncertainty	
Referans Cihaz Reference Instrument	Test Edilen Cihaz Instrument Under Test	Hata Deviation	Bağıl % Relative %	Belirsizlik Uncertainty	Bağıl % Relative %
7,0582	7,054	-0,0042	-0,0595	0,04	0,58
14,1226	14,120	-0,0026	-0,0184	0,08	0,57
17,7474	17,742	-0,0054	-0,0304	0,10	0,57
22,0778	22,073	-0,0048	-0,0217	0,13	0,57
30,9513	30,793	-0,1583	-0,5114	0,18	0,57

Kalibrasyonla İlgili Notlar

Notes About Calibration

Ölçüm sonuçları LPM (litre/dakika) birimi kullanılarak verilmiştir.

Test results are calculated using LPM (liters/minute) unit.

Standart şartlar 20 °C ve 1013,25 mBar'dır.

Standard conditions are 20 °C and 1013.25 mBar.

7. Uygunluk Beyanı

Statement of Compliance

Ölçüm sonuçları ve ölçüm belirsizliği yukarıda verilmiştir. Kullanıcı bunları dikkate alarak uygunluğuna karar vermelidir. Beyan edilen genişletilmiş belirsizlik değeri standart belirsizliğin normal dağılımı için; yaklaşık % 95 güvenilirlik seviyesini sağlayan k=2 kapsam faktörü ile çarpımının sonucudur. Standart ölçüm belirsizliği GUM ve EA-4/02 dokümanlarına uygun olarak belirlenmiştir. Ölçüm sonuçları, genişletilmiş ölçüm belirsizlikleri ve kalibrasyon metodları bu sertifikanın tamamlayıcı bir bölümüdür.

The measurement results and measurement uncertainty were given. The user have to consider the results and decide compliance of the device. The reported extended uncertainty of measurement is based on the standard uncertainty of results by coverage factor k=2, which for a normal distribution corresponds to coverage of approximately 95%. The standard measurement uncertainty is defined according to the GUM and EA-4/02 documents. Measurement results, the extended measurement uncertainty, the measurement and calibration methods, as well as the test results are part of the certificate.

8. Açıklamalar

Remarks

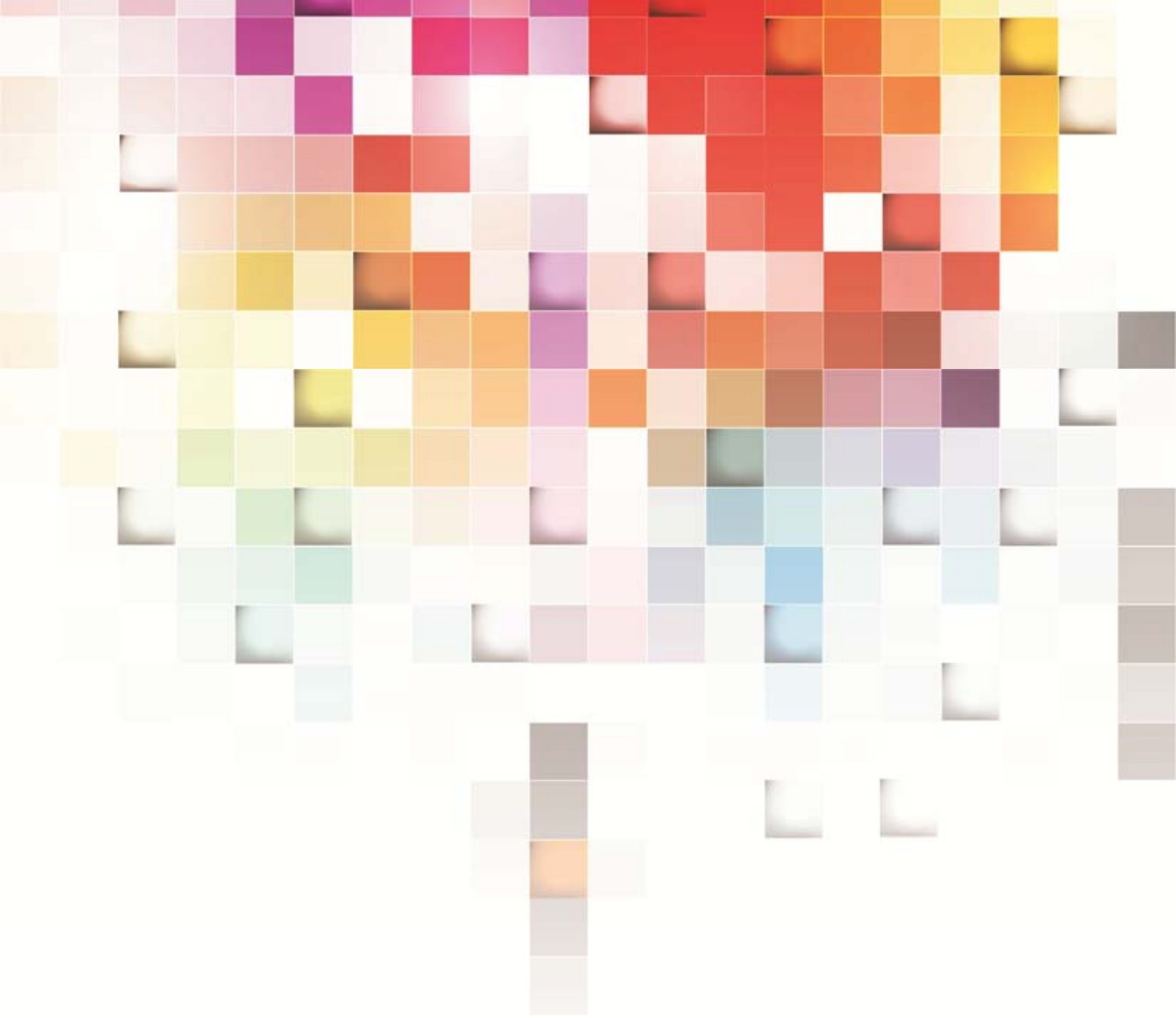
Bu sertifikada bulunan sonuçlar cihazın kalibrasyon tarihindeki durumu kapsar ve uzun dönem kararlılığı hakkında bir öngörü içermez.

The results shown in this certificate refer to the condition of the instrument at the date of calibration and cannot be regarded as indicating the long-term stability of the instrument.



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E-mail: selinlab@selinlab.com.tr

Tel: 0 312 472 94 35-36-37
Faks: 0 312 481 33 01



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BİLİŞİM MÜH.MÜŞ. İNŞ. SAN. VE TİC. A.Ş.

Müşterinin Adı/Adresi:

Customer Name/Address

AGE Batum LTD - Shuakhevi HES
BATUM/Gogebashvili N:60

Müşterinin

Telefonu/Faksı:

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Order No.

15-001/IX

Numunenin Adı ve Tarifi:

Name And Identity Of The
Test Item

Noise Measurement

Deneyin Yapıldığı Tarih:

Date Of Test

11/12/2015 – 12/12/2015

Raporun Numarası ve

Tarihi:

Number And Date Of The
Report

15-GÜR-001/IX-1 – 18/12/2015



Test
TS EN ISO IEC 17025
AB-0237-T

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AB-0237-T

15-GÜR-
001/IX-1

18/12/2015

Deney Raporu / Test Report

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Order No.

Numunenin adı ve tarifi: Noise Measurement
Name and identity of the test item

Numunenin kabul tarihi ve no: 15/12/2015 - 151212-G-2
The date and number of receipt of the test item

Açıklamalar: -
Remarks

Deneyin yapıldığı tarih: 11/12/2015 – 12/12/2015
Date of test

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The test and/or measurement results, the uncertainties (if applicable) with confidence probability and test methods are given on the following pages which are part of this report.

Mühür
Seal

Tarih
Date

18/12/2015

Deneyi Yapan
Test Done by

Murat DİNÇ
Measurement
Responsible

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SKF-SLB-01/39 17.04.2013/ Rev:04

Accreditation No: AB-0237-T

15-GÜR-001/IX-1 – 18/12/2015

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A. INTRODUCTION

This report was prepared as a result of the measurements performed in the explicit address mentioned below;

Date of the Measurement : 11.12.2015 – 12.12.2015
Location of the Measurement : Shuakhevi HEPP

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B. INFORMATION ABOUT THE FACILITY

The construction phase of the Shuakhevi HEPP Project, located in Adjaristsqali River, Georgia, is carried out by AGE Batum LTD.

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C. NOISE MEASUREMENT REPORT

a. Introduction

The noise measurement report has been prepared to take necessary measures to prevent the deterioration of peace and tranquility and physical and mental health of the people due to exposure to environmental noise, according to the "Regulation of Permissions and Licenses to be Obtained in the Scope of Environmental Law" published in Official Gazette dated 04.06.2010 and numbered 27601 and amended on 27.04.2011 with a number of 27917, the following precautions will be taken;

- a) Determining the exposure to environmental noise levels using assessment methods by preparing noise maps, acoustic report and environmental noise levels evaluation reports,
- b) Informing the public about environmental noise and its effects
- c) Preparing the noise prevention and mitigation action plans and implementation of these plans, based on noise maps, acoustic report and environmental noise level evaluation reports results, especially in areas where exposure to environmental noise levels may have harmful effects on human health and in areas where environmental noise quality protection is required,

This regulation scopes the principles and criteria of the environmental noises that the people are exposed in area especially densely populated areas, other quiet areas such as parks or in residential areas, quiet areas in open fields, schools, hospitals and other noise-sensitive areas and the principles and criteria of the damages caused by the environmental vibration in buildings.

Accordingly, for the noise emissions that are emitted from various sources, limit values are determined and Regulation for Assessment of Environmental Noise necessitates the measurement and monitoring noise emissions in these mentioned sources and the compliance with the principles are being determined.

In scope of the mentioned Project, environmental noise measurements have been made in the nearest residential areas to Power House (Concrete Plant and Crusher), Chanckalo Adit, Chirukhistkali Adit, Diakonidze Adit and Skhaltla Outlet working area.

This report is only valid for the **NOISE** measurements performed on **11.12.2015 – 12.12.2015** in the scope of **AGE Batum LTD – Shuakhevi HEPP Project** and **cannot be copied without the written permission of SELİN Measurement Laboratory Co. Inc.** Reports without sign and seal are invalid. Measurement results are only related to operation conditions during measurement. **Our accreditation is restricted with the scope of the experiment methods in our scope. Competence of the opinions and interpretations stated except this is not in the scope of the accreditation.** This report cannot be used for official procedures related to environmental legislation.

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b. Measurement Methods

The measurements were performed according to the standard given below.

TS ISO 1996-2	Acoustics -- Description, measurement and assessment of environmental noise -- Part 2: Determination of environmental noise levels
TS 9315 ISO 1996-1	Acoustics -- Description, measurement and assessment of environmental noise -- Part 1: Basic quantities and assessment procedures

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c. General Principles

- Sources of noise are determined by searching the construction site during the measurement.
- Environmental factors are observed during the measurement and situations which may affect the measurements are registered.
- Measurement time intervals should be chosen as it includes all meaningful deviations in noise emissions and dispersions.
- Noise observations given in related legislation are taken as basis for the evaluation of results of measurement provided.
- Location of microphone used in measurement is determined according to the standards implemented for measurements.
- Attention is paid not to make noise which may affect the measurement during noise measurement.
- Calibration of measurement instrument is carried out before and after the measurement.
- Sound pressure levels change according to weather conditions.

Microphone Locations

Outdoor

To evaluate the situation at a certain location, microphone should be used in subject location.

Free Field Location

Near this location there are not any reflective surface affecting the Noise Pressure Level except ground. Apart from microphone and ground, the distance between a sound reflecting surface and ground should be two times larger than the distance between the microphone and dominant side of sound source.

Microphone on the Reflective Surface

In this case, correction factor to be used to find instantaneous sound area, is +6 dB.

This location is on a reflective surface and an aluminum joint plate with a rubber tape is used as reflective surface.

The front which is 1 m inside of the microphone, should be within $\pm 0,05$ m tolerance and straight. Distance between the edges of microphone and front surface should be more than 1 m. The distance from plate edges of the microphone should be more than 0,1 m in order to decrease the sound refraction in plate edges. Microphone can be used without joint plate if it is produced of solid material such as wall, concrete, stone, glass or wood. In this case, wall surface should be smooth in the 1 m radius from microphone within the $\pm 0,01$ m tolerance.

There are nail holes at the 4 corners of the plate. Plate is fixed to the wall by nailing down from the holes.

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Microphone near the reflective surface

In this case, correction factor to be used to find instantaneous sound area, is -3 dB.

In an ideal case, i.e., if there is not any vertical deflection barrier interfering the sound dispersion to the receiver, the difference between the microphone set up 2 m front of the front and the microphone in the free field area conditions is approximately 3dB. Therefore, the microphone is placed in 2 m distance from the front.

For more general addressing, microphone height should be (4,0 m $\pm$ 0,5) m when choosing the microphone location in multistory building regions. In single-floor regions, microphone height should be used as (1,5 m $\pm$ 0,1) m.

In order to address the noise, generally, noise levels at grid points are calculated. Measurements for special cases are conducted according to intensity of the grid points chosen in a certain location, spatial resolution required for research subject and spatial change of sound pressure levels in noise. This change is larger at regions near the source and around the larger barriers. Therefore, in these areas, intensity of grid points should be more. In general, difference of Noise Pressure Level between two neighbor grid points should not exceed 5 dB. When it is come across with larger differences, grid breakpoints should be added.

Dependant to the limitations and rules whose outlines are given below, this location aims to reach the 3 dB increase at instantaneous sound pressure level(free field area level). When the microphone is in a certain distance away from the reflective surface, direct sound and reflective sound are equally strong and if the related frequency band is wide enough, this reflection doubles up the sound area energy and leads to a 3 dB increase in sound pressure level.

Front should be a platform within a $\pm$ 0,3 m tolerance and microphone, it should be placed in a sound area between building surfaces that stand out where it will be affected by multiple reflections of sound. Windows should be accepted as a part of the front. And they should be closed during measurements. In total, measured equivalence is intended to provide that the instantaneous sound level does not deviate more than +3 dB.

Indoor

At least three different microphone locations, distributed into the room at even intervals, should be used where the persons affected by the sound will spend time.

If it is thought that the noise with a lower frequency is dominant, one of the three microphone locations should be at the corner of the room. Location of the corner microphone should be 0,5 m distant from whole circumference surfaces of a corner which is a wall and 0,5 m distant from the nearest wall opening.

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Other microphones should be placed at a 0,5 m distance away from walls, ceiling and laying and 1 m distance away from conducting components such as Windows or air intakes. The distance between two neighbor microphones should be at least 0,7 m.

The operations in this subject are designed for rooms with a volume of smaller than 300 m³. In larger rooms it is appropriate to use more microphone locations. In such cases, one third of the additional microphone locations should be in corners for noises with low frequency. If the room volume exceeds 300 m³, additional microphone locations are defined.

Tone Sound

If the noise characteristics at the receiver location involve audible sound tone(s), objective measurement should be done for the precision of these tones. Microphone locations where more audible tones exist, should be selected and analysis should be done as explained below.

Experiment for the determination of the existence of spectrum component with separated frequency, is typically done by comparing the Noise Pressure Level with time average in the same part of the 1/3 octave band, and the Noise Pressure Level with time average in two neighbor 1/3 octave bands. Time averaged Noise Pressure Level in 1/3 octave band concerned in order to reveal the existence of spectrum component with separated frequency, should exceed the two neighbor time averaged sound pressure levels in 1/3 octave bands with a certain level difference.

Constant level difference can be change depending on the frequency. Possible options for the level differences are given below:

- Ø 15 dB in low frequency 1/3 octave bands (25 Hz -125 Hz).
- Ø 8 dB in middle frequency bands (160 Hz - 400 Hz).
- Ø 5 dB in high frequency bands (500 Hz-10000 Hz).

Tone analysis of noise is not done in indoors.

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d. Measurement System

Measurements were carried out with 127154 serial numbered measurement instrument. Technical specifications of the equipment is given below whereas calibration certificate is given in **Appendix 2**.

- Instrument is able to perform measurement between 10Hz – 20kHz. It gives statistics such as SPL, LEQ, SEL, Lden, Ltm3, Ltm5 etc.
- It can make measurement independently at A, C, Lin bands of IMPULSE, FAST, SLOW detector for each channel.
- Instrument automatically saves the measurements.
- Measurement in dark areas can be performed by its light.
- Time constants: (SOLW, FAST, IMPULSE).
- It can make 1/1 and 1/3 octave band analysis from 0.8 Hz up to 20kHz (45 filters).

The calibrations were made with 117566 serial numbered calibrator. After and before each measurement series, the calibrations are being performed. In this process, the microphone of the device is placed into the calibrator conjunction and than the reference noise level is being monitored from the screen, and if there are any deviations, they are kept in the specified tolerances.

Technical specifications are as follows.

- Calibrator produces noise in 1 Khz frequency, 94 dBA and 114 dBA.
- The heat and pressure values are entered in atmospheric conditions and the corrections about these data are performed automatically by the calibrator.
- Stabilization duration is 3 seconds. .
- The device is complied with the IEC 60942:2003 Class 1 standards.

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e. Definitions and Abbreviations

L_{eq} TS 9315 (ISO 1996-1) : An indicator of a of a noise levels that varies within a certain time in terms of energy which is equivalent to a constant level.

dBA = This is a sound assessment unit of which the human ear is most sensitive and the mid and high frequency sounds are emphasized. dBA unit is commonly used in the noise reduction or in the control, is also related to the subjective evaluation of the volume.

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f. Legal Status

The mentioned activity is being scrutinized in scope of the Article 23, items a and d of the Regulation for Assessment of Environmental Noise, Noise at Work Places, Residential and Public Buildings and Residential Territories (SRS 2.2.4/2.1.8 003/004-01,(Georgian Information Bulletin) and IFC Noise Guidelines Table 1.7.

1-“Environmental noise criteria for construction sites”

ARTICLE 23 – (1) Criteria related to the prevention of noise and noise level distributed in the environment from the construction sites are determined below:

a) Noise level distributed in the environment from the construction sites cannot exceed the limit values given in Table 5 of Annex-VII (Limit Value= 70 dBA)

d) Impact noise that might be generated as result of construction activity cannot exceed 100 dBC in terms of LCmax noise indicator.

2-“ Noise at Work Places, Residential and Public Buildings and Residential Territories (SRS 2.2.4/2.1.8 003/004-01,(Georgian Information Bulletin (GIB))”

Table 1 Admissible Noise Norms.

Receiver	Admissible Noise Norms	
	Maximum allowed norms of noise dBA	
	Day 07:00 – 23:00	Night 23:00 – 07:00
For residential area	70	60

3-“IFC Noise Guidelines Table 1.7”

Table 2 IFC Noise Guidelines Table 1.7.

Receiver	IFC GENERAL ÇGS GUIDELINESS April 2007 - Table 1.7.1. Noise Level Guidelines	
	Hourly LAeq (dBA)	
	Day 07:00 – 22:00	Night 22:00 – 07:00
Residential; institutions, educational	55	45
Industrial, commercial	70	70
Note:	Values that are measured besides the values given in the Guidelines. Source: <i>Guidelines for Community Noise, World Health Organization (WHO), 1999</i> These limits should be met by either with noise preventive activities or the noise should be more than 3 dBA, at max.	

Noise levels should not exceed the levels presented in IFC Noise Guidelines Table 1.7, or result in a maximum increase in background levels of 3 dB at the nearest receptor location off-site.

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g. Measurement Results

In scope of the mentioned Project, environmental noise measurements have been made in the nearest residential areas to the Power House (Concrete Plant and Crusher), Chanckalo Adit, Chirukhistskali Adit, Diakonidze Adit and Skhalta Outlet working area.

Table 3 Results of Noise Measurements.

Measurement Point	Date	Measurement Type	Result of Measurement (dBA)			Limit Value (ÇGDYY)		Limit Value (GIB)		Limit Value (IFC)	
			L _{eq}	L ₉₀	L _{Cmax}	L _{eq}	L _{Cmax}	L _{eq}	L _{Cmax}	L _{eq}	L _{Cmax}
HES (Hazır Beton Santrali ve Konkasör)-Receiver Point 38 263305 E 4613165 N	11 December 2015	Noise Level Measurement	50,7	49,1	61,6	70	100	70	-	55,0	-
HES (Hazır Beton Santrali ve Konkasör)-Receiver Point 38 263305 E 4613165 N	11 December 2015	Background Noise Level Measurement	49,5	42,8	60,2	-	-	-	-	-	-
Chanckalo Adit -Receiver Point 38 268971 E 4613117 N	11 December 2015	Noise Level Measurement	52,3	47,1	62,5	70	100	70	-	55,0	-
Chanckalo Adit -Receiver Point 38 268971 E 4613117 N	11 December 2015	Background Noise Level Measurement	50,8	42,4	64,3	-	-	-	-	-	-
Chirukhistskali Adit -Receiver Point 38 276334 E 4602782 N	12 December 2015	Noise Level Measurement	59,5	57,7	73,5	70	100	70	-	55,0	-
Chirukhistskali Adit -Receiver Point 38 276362 E 4602739 N	12 December 2015	Background Noise Level Measurement	57,8	40,0	72,7	-	-	-	-	-	-
Diakonidze Adit -Receiver Point 38 277721 E 4615210 N	12 December 2015	Noise Level Measurement	50,5	47,7	63,9	70	100	70	-	55,0	-
Diakonidze Adit -Receiver Point 38 277721 E 4615210 N	12 December 2015	Background Noise Level Measurement	48,4	41,0	59,8	-	-	-	-	-	-
Skhalta Outlet -Receiver Point 38 280151 E 4614458 N	12 December 2015	Noise Level Measurement	47,3	44,5	59,0	70	100	70	-	55,0	-
Skhalta Outlet -Receiver Point 38 280151 E 4614458 N	12 December 2015	Background Noise Level Measurement	45,6	35,5	55,6	-	-	-	-	-	-

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Background exceeding levels are given in Table 4.

Table 4 Background exceeding levels.

Measurement Point	$L_{Source} + L_{Background}$ Result of Measurement (dBA)	$L_{Background}$ Result of Measurement (dBA)	L_{Source} (dBA)	*Background Noise Adjustment is Done Difference	Background Noise Adjustment isn't Done Difference	Limit Value (ÇGDYY)	Limit Value (GIB)	Limit Value (IFC)
				$L_{Source} - L_{Background}$	$L_{Source} + L_{Background} - L_{Background}$	dBA	dBA	dBA
HES (Hazır Beton Santrali ve Konkasör)-Receiver Point 38 263305 E 4613165 N	50,7	49,5	44,53	-4,97	1,20	-	-	3,0
Chanckalo Adit -Receiver Point 38 268971 E 4613117 N	52,3	50,8	46,95	-3,85	1,50	-	-	3,0
Chirukhistkali Adit -Receiver Point 38 276334 E 4602782 N	59,5	57,8	54,60	-3,20	1,70	-	-	3,0
Diakonidze Adit -Receiver Point 38 277721 E 4615210 N	50,5	48,4	46,34	-2,06	2,10	-	-	3,0
Skhalta Outlet -Receiver Point 38 280151 E 4614458 N	47,3	45,6	42,40	-3,20	1,70	-	-	3,0
* TS ISO 1996-2 – If the background noise level is 3dB or much lower than the measured noise pressure level, no correction is not allowed. The corrections are only done in cases where the background noise level is lower than 3 or 10 dB. -The red colored numbers are taken into consideration during the assessment values.								

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h. Assessment of Measurement Results

1-“Environmental noise criteria for construction sites”

ARTICLE 23 – (1) Criteria related to the prevention of noise and noise level distributed in the environment from the construction sites are determined below:

a) Noise level distributed in the environment from the construction sites cannot exceed the limit values given in Table 5 of Annex-VII (Limit Value= 70 dBA)

As it is seen in the measurement results given in Table 3, the 70 dBA limit value is not exceeded.

d) Impact noise that might be generated as result of construction activity cannot exceed 100 dBC in terms of LCmax noise indicator.

As it is seen in the measurement results given in Table 3, the 100 dBC limit value is not exceeded.

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2-“ Noise at Work Places, Residential and Public Buildings and Residential Territories (SRS 2.2.4/2.1.8 003/004-01,(Georgian Information Bulletin (GIB))”

Table 5 Admissible Noise Norms.

Receiver	Admissible Noise Norms	
	Maximum allowed norms of noise dBA	
	Day 07:00 – 23:00	Night 23:00 – 07:00
For residential area	70	60

As it is seen in the measurement results given in Table 3, the 70 dBA limit value is not exceeded.

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3-“IFC Noise Guidelines Table 1.7”

Table 6 IFC Noise Guidelines Table 1.7.

Receiver	IFC GENERAL ÇGS GUIDELINESS April 2007 - Table 1.7.1. Noise Level Guidelines	
	Hourly LAeq (dBA)	
	Day 07:00 – 22:00	Night 22:00 – 07:00
Residential; institutions, educational	55	45
Industrial, commercial	70	70
Note:	Values that are measured besides the values given in the Guidelines. Source: <i>Guidelines for Community Noise, World Health Organization (WHO), 1999</i> These limits should be met by either with noise preventive activities or the noise should be more than 3 dBA, at max.	

As it is seen in the measurement results given in Table 3, the 55 dBA limit value is not exceeded.

As it can be seen from the measurement results given in Table 3, the nearest residential areas to the Chirukhistkali Adit background noise level is higher than 55 dBA. Thus, an assessment haven't been made in scope of IFC Noise Guidelines Table 1.7.

Noise levels should not exceed the levels presented in IFC Noise Guidelines Table 1.7, or result in a maximum increase in background levels of 3 dB at the nearest receptor location off-site.

As it is seen in the measurement results given in Table 4, L_{eq} the level of background noise in terms of noise indicators, the 3 dBA value is not exceeded.

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D. APPENDICES

- APP-1** : LABORATORY DOCUMENTS
- APP -2** : DOCUMENTS OF THE MEASUREMENT EQUIPMENT
- APP -3** : DOCUMENTS OF THE PERSONNEL WHO PREPARED THE REPORT AND MADE THE MEASUREMENT

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APP-1 LABORATORY DOCUMENTS

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TÜRK AKREDİTASYON KURUMU

AKREDİTASYON SERTİFİKASI

Deney Laboratuvarı olarak faaliyet gösteren,

SELİN ÖLÇÜM LABORATUVAR HİZMETLERİ
Bilişim Müşavirlik İnşaat San Ve Tic A. Ş.
Deney Laboratuvarı
1324.Cadde Özlem Apt. No:30/C Öveçler
06450 ANKARA / TÜRKİYE

TÜRKAK tarafından yapılan denetim sonucunda TS EN ISO/IEC 17025:2012 Standardına göre Ek'te yer alan kapsamlarda akredite edilmiştir.

Akreditasyon No : AB-0237-T

Akreditasyon Tarihi : 31 Temmuz 2009

Revizyon Tarihi / No : 10 Nisan 2015 / 06

Bu Sertifika, yukarıda açık adı ve adresi yazılı Kuruluşun TS EN ISO/IEC 17025:2012 Standardına, ilgili Yönetmelik ve Tebliğlere uygunluğunu sürdürmesi halinde, **27 Kasım 2017** tarihine kadar geçerlidir.




Dr. H. İbrahim ÇETİN
Genel Sekreter

F701-040

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Akreditasyon Sertifikası Eki (Sayfa 1/6)

Akreditasyon Kapsamı

 Test TS EN ISO IEC 17025 AB-0237-T	SELİN ÖLÇÜM LABORATUVAR HİZMETLERİ Bilişim Müşavirlik İnşaat San Ve Tic A. Ş. Akreditasyon No: AB-0237-T Revizyon No: 06 Tarih: 10 Nisan 2015	
	Deney Laboratuvarı Adresi : 1324.Cadde Özlem Apt. No:30/C Öveçler 06450 ANKARA / TÜRKİYE	
	Tel : 0 312 472 94 35 Faks : 0 312 481 33 01 E-Posta : selinlab@gmail.com Website : www.selinlab.com.tr	
Deneyi Yapılan Malzemeler / Ürünler	Deney Adı	Deney Metodu (Ulusal, Uluslararası standartlar, işletme içi metodlar)
Gürültü	Çevresel gürültü düzeyinin tespiti/ L_{Aeq} , L_{max} , L_f , L_{ReqT} , L_{Rf} , L_{day} , L_{iden} , $L_{evening}$, $L_{Reqj,Tn}$, L_{iden} , L_{CE} , L_{RT} , L_{fmax} , L_{Cenmax} , L_{corr} , R , L_{PT}	TS 9315 ISO 1996-1 ve TS 9315 ISO 1996-1/T1 TS ISO 1996-2 ve TS ISO 1996-2
Akustik	Çoklu gürültü kaynağına sahip sanayi tesislerinde yapılan ses basıncı düzeyi ölçümlerinden ses gücü düzeyinin tayini L_p , L_p^* , $L_{eq,T}$, h , ΔL_s , ΔL_f , ΔL_w , ΔL_u , L_w	TS ISO 8297
	Gürültü kaynaklarının mühendislik metodu kullanılarak yapılan ses basıncı düzeyi ölçümlerinden ses gücü düzeyinin tayini/ L_p , $L_{peq,T}$, K_u , $L'p$, $L''p$, L_{AP} , L_w , ΔL	TS EN ISO 3744
	Gürültü kaynaklarının gözlem metodu kullanılarak yapılan ses basıncı düzeyi ölçümlerinden ses gücü düzeyinin tayini L_p , $L_{peq,T}$, K_u , K_v , $L'p$, $L''p$, L_{AP} , L_w , ΔL	TS EN ISO 3746
	Yerleşim alanlarında sesin açık alanda yayılırken azaltım faktörlerinin ve çevresel gürültü düzeyinin tespiti/ $\Delta L(f)$, f_{s0} , f_{m0} , f_{m1} , α_s , α_{d0} , α_{v0} , N , L_{AT} , L_{RT} , $L_{RT} (DW)$, D_G , A_{div} , A_{atm} , A_{gr} , A_{bar} , A_{mix} , $L_{AT}(LT)$	TS ISO 9613-1 TS ISO 9613-2
	Demiryolu ulaşım araçlarının ses gücü düzeyinin ve demiryolu gürültüsünün alansal dağılımının hesaplanması E , LE , LE^{bs} , LE^{as} , C_{bajm} , L_{den} , L_{day} , L_{Aeq} , L , E_s , $C_{yanisma}$, D_{mesafe} , D_{havay} , D_{toprak} , D_{meteo}	Hollanda ulusal hesaplama yöntemi RMR SRM II

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Akreditasyon Sertifikası Eki (Sayfa 2/6)

Akreditasyon Kapsamı

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Deneyi Yapılan Malzemeler / Ürünler	Deney Adı	Deney Metodu (Ulusal, Uluslararası standartlar, işletme içi metodlar)
(Akustik Devam)	Karayolu ulaşım araçlarının ses gücü düzeyinin ve karayolu gürültünün alansal dağılımında hesaplanması/ L_{den} , L_{day} , $L_{evening}$, L_{night} , $L_{longterm}$, L_{eq} , L , L_w , A_{dir} , A_{atm} , A_{grf} , A_{at} , f Yapıların akustik performansının değerlendirilmesi Yapılarda ve yapı elemanlarında ses yalıtımının ölçülmesi/ R' , A , L_p , L_v , L_n , W_n , D_{nT}	Fransız ulusal hesaplama yöntemi NMPB - 96 ve Fransız standardı XPS 31-133 TS EN 12354-4 TS ISO 140-4
Titreşim	Madencilik faaliyetleri sonucunda oluşan hava şoku ve yer titreşiminin ölçülmesi/ a , V , P_c Makine ve Ekipmanlardan Kaynaklanan Mekanik Titreşim Sonucu Oluşan Yapı Titreşiminin Ölçülmesi ve Binalara Etkilerinin Değerlendirilmesi/ τ_r , a , V Gaz Türbini Setlerinin dönmeyen parçalarında titreşimin ölçülmesi ve değerlendirilmesi V_{rms} Hidroelektrik Santrallerde Dönmeyen Parçalarda Titreşim Ölçümleriyle Makinelerin Değerlendirilmesi V_{rms}	TS 10354 TS ISO 4866 ISO 10816-4 ISO 10816-5
İSG (Gürültü)	Kişilerin maruz kaldığı gürültü düzeyinin ölçülmesi ve işitme kayıplarının tespiti L_{pA} , $E_{A,T}$, $L_{Aeq,T}$, $L_{EX,h}$, H , N , H'	TS 2607 ISO 1999
İSG (Titreşim)	Elle İletilen Titreşimin Ölçülmesi ve Değerlendirilmesi- $\dot{a}_{hw}$, $\dot{a}_{hwz}$, $\dot{a}_{hwv}$, $\dot{a}_{hwz}$, $\dot{a}_{hwv}$, $\dot{a}_{hw}$ (eşit, 8 saat), $A(8)$, D_y	TS EN ISO 5349-1



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Akreditasyon Sertifikası Eki (Sayfa 3/6)

Akreditasyon Kapsamı

 TÜRKAK TSE EN ISO/IEC 17025 AB-0237-T	SELİN ÖLÇÜM LABORATUVAR HİZMETLERİ Bilişim Müşavirlik İnşaat San Ve Tic A. Ş. Akreditasyon No: AB-0237-T Revizyon No: 06 Tarih: 10 Nisan 2015
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Deneyi Yapılan Malzemeler / Ürünler	Deney Adı	Deney Metodu (Ulusal, Uluslararası standartlar, işletme içi metodlar)
(İSG (Titreşim) Devam)	Elden Vücuda İletilen Titreşimin Ölçülmesi ve Değerlendirilmesi - $\dot{a}_{hw}$, $\dot{a}_{hv}$, $\dot{a}_{hwix}$, $\dot{a}_{hviy}$, $\dot{a}_{hwiz}$, $A(8)$, $Ai(8)$	TS EN ISO 5349-2
	Titreşim - Mekanik Titreşim ve Şok - Tüm Vücut Titreşime Maruz Kalma Değerlendirilmesi / $\dot{a}_x$, $\dot{a}_y$, $\dot{a}_z$	TS ISO 2631-1
	Hareketli Makinelerde Titreşim Düzeyinin Tespiti / $\dot{a}_w$, $\dot{a}_{hw}$, $\dot{a}_{hwz}$, $\dot{a}_{hwy}$, $\dot{a}_{hwz}$, $\dot{a}_{wenz}$	TS EN 1032+A1
Çalışma Ortamında Maruziyet	Kimyasal Madde Ölçümleri ve Değerlendirmesi	ASTMD 4490-96 TS EN 689
	Optik yansıma ve gravimetrik yöntem ile toz tayini	MDHS 14/3
	Aydınlatma düzeyinin tespiti/Aydınlatma seviyesi	COHSR-928-1-IPG-039
	Termal Konforun tespiti, çalışma şartlarının insanlar üzerindeki etkisinin belirlenmesi/ Hava akım hızı, küresel sıcaklık, ortam sıcaklığı, bağıl nem, yaş hazne sıcaklığı ve küresel sıcaklık	TS EN ISO 7730
	Termal Konforun tespiti ve soğuk çalışma şartlarının insanlar üzerindeki etkisinin belirlenmesi/ Hava akım hızı, küresel sıcaklık, ortam sıcaklığı, bağıl nem, yaş hazne sıcaklığı ve küresel sıcaklık	TS EN 27243
	İşyeri ortam havasında aktif karbon tüplerine VOC numunesinin alınması ve gaz kromatografi yöntemi ile VOC tayini /VOC	TS ISO 16200-1



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Akreditasyon Sertifikası Eki (Sayfa 4/6)

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Deneyi Yapılan Malzemeler / Ürünler	Deney Adı	Deney Metodu (Ulusal, Uluslararası standartlar, işletme içi metodlar)
Bacagazı (Emisyon) (TS CEN/TS 15675 ve TS EN 15259 şartlarına uygun)	Sabit Kaynak Emisyonlarında Elektrokimyasal Hücre Metodu ile SO ₂ Tayini	TS ISO 7935
	Sabit Kaynak Emisyonlarında Elektrokimyasal Hücre Metodu ile CO ₂ , O ₂ , CO	TS ISO 12039
	Sabit Kaynak Emisyonlarında Elektrokimyasal Hücre Metodu ile NO _x (NO+NO ₂) Tayini	EPA CTM 022
	Nokta Kaynak Emisyonları - Borulardaki Gaz Akışlarının Hız Ve Debisinin Ölçülmesi	TS ISO 10780
	Baca Gazları - Destile Yakıtların Yanmasıyla Meydana -Gelen Duman Yoğunluğu (İslilik) Tayini- Bacharach Yöntemiyle	TS 9503
	Sabit Kaynak Emisyonlarında Nem İçeriğinin Tayini	EPA Metot 4
	Nem Probu ile Nem Tayini (≤ 180°C baca sıcaklığı için)	İşletme İçi Metot (Baca Sıcaklığı <180°C)
	Sabit Kaynak Emisyonları-Tanecikli Maddenin Kütle Derişiminin Elle Tayini- Referans metot	TS ISO 9096
	Sabit Kaynak Emisyonları-Tozun Düşük Aralıktaki Kütle Derişiminin Tayini-Bölüm 1: Manuel Gravimetrik Metot- Referans metot	TS EN 13284-1
	Sabit Kaynak Emisyonlarında Toz Emisyon Miktarının Tayini (Baca dışı örnekleme)	EPA Metot 5



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 TÜRKAK Test TS EN ISO/IEC 17025 AB-0237-T	SELİN ÖLÇÜM LABORATUVAR HİZMETLERİ Bilişim Müşavirlik İnşaat San Ve Tic A. Ş. Akreditasyon No: AB-0237-T Revizyon No: 06 Tarih: 10 Nisan 2015
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Deneyi Yapılan Malzemeler / Ürünler	Deney Adı	Deney Metodu (Ulusal, Uluslararası standartlar, işletme içi metodlar)
(Bacagazı (Emisyon) (TS CEN/TS 15675 ve TS EN 15259 şartlarına uygun) Devam)	Sabit Kaynak Emisyonlarında Toz Emisyon Miktarının Tayini (Baca içi örnekleme)	EPA Metot 17
	Sabit Kaynak Emisyonlarında Toplam Flor Miktarının Tayini-SPANDS Metodu	EPA Metot 13 A
	Sabit Kaynak Emisyonları- HF örnekleme ve gaz halindeki florürlerin kütle konsantrasyonunun tayini- Referans metot	ISO/FDIS 15713
	Sabit Kaynak Emisyonları- HCL olarak tanımlanan gaz halindeki klorürlerin kütle konsantrasyonunun tayini- Standard Referans Yöntem	TS EN 1911
	Sabit Kaynak Emisyonları- Gaz Halindeki Münferit Organik Bileşiklerin Kütle Derişimlerinin Tayini-Aktif Karbon Ve Çözücü Desorpsiyonu Metodu	TS EN 13649
	Sabit Kaynak Emisyonları- Baca Gazlarında Düşük Derişimlerde Bulunan Gaz Halindeki Toplam Organik Karbonun Kütle Derişiminin Tayini- Alev İyonlaştırma Detektörü Kullanılan Sürekli Metot- Referans metod	TS EN 12619
Hava Kalitesi (İmisyon) Ölçümleri	Hava Kalitesi - Askıda Katı Maddenin PM10 Kesrinin Tayini	EPA 40 CFR Part 50 Appendix J ve M



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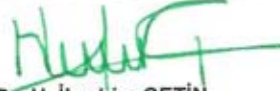
Akreditasyon Sertifikası Eki (Sayfa 6/6)

Akreditasyon Kapsamı

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Deneyi Yapılan Malzemeler / Ürünler	Deney Adı	Deney Metodu (Ulusal, Uluslararası standartlar, işletme içi metodlar)
(Hava Kalitesi (İmisyon) Ölçümleri Devam)	Hava Kalitesi - Askıda Katı Maddenin PM10 Kesrinin Tayini - Ölçme Yöntemlerinin Referans Eşdeğerliğini Göstermek İçin Saha Deney İşlemi Ve Referans Metodu	TS EN 12341
	Hava Kirliliği Ölçme Metotları Yönlendirilebilir Çökelti Ölçme Cihazı Kurma Ve Çalıştırma Metodu- Çöken Toz Tayini	TS 2342

KAPSAM SONU




Dr. H. İbrahim ÇETİN
Genel Sekreter

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APP -2

DOCUMENTS OF THE MEASUREMENT EQUIPMENT

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CEL 490 - CALIBRATION CERTIFICATE OF THE NOISE MEASUREMENT DEVICE

 AVL Kalibrasyon Laboratuvarı		TÜRKAK TÜRK AKREDİTASYON KURUMU TURKISH ACCREDITATION AGENCY tarafından akredite edilmiştir.		 TÜRKAK
AVL AKUSTİK VİBRASYON KALİBRASYON LABORATUVARI		Kalibrasyon TS EN ISO/IEC 17025 AB-0089-K		AB-0089-K
İvedik O.S.B. 1385. Sk. No: 10 OSTİM / ANKARA		2014-1100		11-2014
<i>Kalibrasyon Sertifikası</i> Calibration Certificate				
Cihazın Sahibi Customer Name	:	SELİN ÖLÇÜM LAB. HİZM. BİL. MÜH. MÜŞ. İNŞ. SAN. VE TİC. A.Ş. Çetinemeç Bulvarı 1324. Cadde No.30/C Öveçler Dikmen / ANKARA		
İstek Numarası Order No.	:	TEK-2014-505		
Makine / Cihaz Instrument / Device	:	Ses Seviyesi Ölçüm Cihazı Sound Level Meter		
İmalatçı Manufacturer	:	CASELLA		
Tip Type	:	CEL-490		
Seri Numarası Serial number	:	127154		
Kalibrasyon Tarihi Date of calibration	:	6.11.2014		
Sertifika Sayfa Sayısı Number of pages of the certificate	:	6		
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Mühür 	Tarih Date 6.11.2014	Kalibrasyonu Yapan Calibrated by Ayşegül Balmaz	Laboratuvar Müdürü Head of the Calibration Laboratory Younes NEVAYE SHIRAZI	

Bu sertifika, laboratuvarın yazılı izni olmadan kısmen kopyalanıp çoğaltılamaz.
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AB-0089-K

2014-1100

11-2014

1. Cihaza Ait Bilgiler

Device to be Calibrated

Cihazın Adı : Ses Seviyesi Ölçüm Cihazı
Name of the Instrument : Sound Level Meter
İmalatçısı : CASELLA
Manufacturer
Seri Numarası : 127154
Serial Number
Ölçüm Aralığı : 18,5 dB - 140 dB
Measuring Range
Bölüntüsü : 0,1
Scale Division
Tipi : CEL-490
Type

2. Cihazın Laboratuvara Kabul Tarihi

Date of Receipt of Device

: 3.11.2014

3. Kalibrasyon Metodu

Calibration Method

Kalibrasyon IEC 61672-3 Standardında tarif edilen testlere göre yapılmıştır. AVL PR.LBBR.501 Elektroakustik Ses Ölçerleri Periyodik Kalibrasyon prosedürü kullanılmıştır. Ölçümlerden ve testlerden önce ses seviyesi ölçüm cihazı kalibre edilmiştir.

Calibration was made according to IEC 61672-3 Standard. AVL Procedure PR.LBBR.501 was used in calibration of the sound level meters. Sound level meter was calibrated before measurement.

4. Çevresel Şartlar

Environmental Conditions

Ortam Sıcaklığı : 20,1 ± 3 °C
Ambient Temperature
Bağıl Nem : 42 ± 25 %
Relative Humidity
Ortam Basıncı : 912 ± 1 hPa
Ambient Pressure

5. Kalibrasyonda Kullanılan Referans Cihazlar

Reference Equipments Used During Calibration

Cihaz Device	İmalatçı Manufacturer	Seri No Serial No	Tipi Type	Sertifika No Certificate No	İzlenebilirlik Traceability
Mikrofon	Brüel & Kjaer	2709959-2154	4192-MV203	0352	Spektra
Akustik Kalibratör	Brüel & Kjaer	2705957	4231	0530	Spektra
Pistonfon	RION	37290219	NC-72A	0531	Spektra
Termo - Hygrometre	KIMO	7122852	KH100	4.02209	UMS

Kalibrasyonlarımızda Spektra CS18 kalibrasyon sistemi ve yazılımları kullanılmaktadır.

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6. Ölçüm Belirsizliği

Measurement Uncertainty

Frekans Ağırlıklı Akustik Test : 31,5 ile 2 KHz : $\pm 0,30$ dB 2 KHz ile 5 KHz : $\pm 0,50$ dB
Acoustical Tests of Frequency Weighting

Seviye Doğrusallığı Testi : $\pm 0,10$ dB
Level Linearity Test

7. Kalibrasyon Sonuçları

Calibration Results

7.1. 1000 Hz 94 dB Kalibrasyon

Calibration at frequency point 1000 Hz 94 dB

Kalibrasyondan Önceki Değer : 93,7 dB
Value Before Calibration

Sapma : -0,30 dB
Deviation

7.2. C - Frekans Ağırlıklı Akustik Test

Acoustical Signal Tests of a C - Frequency Weighting

Frekans	Uygulanan SPL	Okunan Ses Seviyesi	Standart Sapma	Tepki Farkı	C-Ağırlıklı Filtre Karakteristiği	Tepki Farkı Sapma	Tolerans
Frequency	Applied SPL	Measured Sound Level	Standard Deviation	Response Difference	C-Weighted Filter Characterization	Response Deviation	Tolerance
Hz	dB	dB	%	dB	dB	dB	dB
63,00	74,79	74,10	0,14	-0,69	-0,80	0,11	$\pm 1,5$
80,00	74,95	74,50	0,10	-0,45	-0,50	0,05	$\pm 1,5$
100,00	75,03	74,60	0,07	-0,43	-0,30	-0,13	$\pm 1,5$
125,00	75,00	74,70	0,14	-0,30	-0,20	-0,10	$\pm 1,5$
160,00	75,00	74,80	0,13	-0,20	-0,10	-0,10	$\pm 1,5$
200,00	75,02	74,90	0,60	-0,12	0,00	-0,12	$\pm 1,5$
250,00	74,96	75,90	0,05	0,94	0,00	0,94	$\pm 1,4$
315,00	74,99	75,60	0,04	0,61	0,00	0,61	$\pm 1,4$
400,00	75,01	75,00	0,10	-0,01	0,00	-0,01	$\pm 1,4$
500,00	75,00	75,00	0,04	0,00	0,00	0,00	$\pm 1,4$
630,00	75,02	75,00	0,08	-0,02	0,00	-0,02	$\pm 1,4$
800,00	75,02	75,00	0,22	-0,02	0,00	-0,02	$\pm 1,4$
1000,00	75,02	75,00	0,09	-0,02	0,00	-0,02	$\pm 1,1$
1250,00	75,02	75,00	0,07	-0,02	0,00	-0,02	$\pm 1,4$
1600,00	75,01	74,90	0,05	-0,11	-0,10	-0,01	$\pm 1,6$
2000,00	75,01	74,80	0,02	-0,21	-0,20	-0,01	$\pm 1,6$
2500,00	75,02	74,80	0,02	-0,22	-0,30	0,08	$\pm 1,6$
3150,00	75,01	74,80	0,01	-0,21	-0,50	0,29	$\pm 1,6$
4000,00	75,00	74,80	0,01	-0,20	-0,80	0,60	$\pm 1,6$
5000,00	75,01	75,30	0,01	0,29	-1,30	1,59	$\pm 2,1$

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7.3. 1 kHz de Frekans & Zaman Ağırlıklı Test

Frequency & Time Weighted Test at 1 kHz

Frekans Frequency Hz	Frekans / Zaman Ağırlığı Frequency / Time Weighting	Voltaj Voltage V	Okunan Değer Measured Value dB	Sapma Deviation dB
1000,000	A-Fast	0,04149	94,00	Referans Değer
1000,000	C-Fast	0,041517	94,00	0,00
1000,000	Z-Fast	0,041516	94,00	0,00
1000,000	A-Slow	0,041468	94,00	0,00

İşlem Procedure	İşlem Sonucu Procedure Result dB	Tolerans Tolerance dB
$L_{AF} - L_{AS}$	0,00	±0,3
$L_{AF} - L_{CF}$	0,00	±0,4
$L_{AF} - L_{ZF}$	0,00	±0,4

7.4. Frekans Ağırlıklı - Elektriksel Test

Frequency Weighted Electrical Test

Frekans Frequency Hz	Uygulanan Voltaj Applied Voltage V	Okunan Ses Seviyesi Measured Sound Level dB	Tepki Farkı Response Difference dB	A-Ağırlıklı Filtre Karakteristiği A-Weighted Filter Characterization dB	Tepki Farkı Sapma Response Deviation dB	Tolerans Tolerance dB
1000,00	0,041508	94,00	Ref. Değer	---	---	---
63,00	0,041501	67,80	-26,20	-26,20	0,00	±1,5
80,00	0,041669	71,60	-22,43	-22,50	0,07	±1,5
100,00	0,041462	74,80	-19,19	-19,10	-0,09	±1,5
125,00	0,041503	77,80	-16,20	-16,10	-0,10	±1,5
160,00	0,041654	80,70	-13,33	-13,40	0,07	±1,5
200,00	0,041457	83,10	-10,89	-10,90	0,01	±1,5
250,00	0,041509	85,30	-8,70	-8,60	-0,10	±1,4
315,00	0,041595	87,40	-6,62	-6,60	-0,02	±1,4
400,00	0,041426	89,20	-4,78	-4,80	0,02	±1,4
500,00	0,041488	90,80	-3,20	-3,20	0,00	±1,4
630,00	0,041583	92,10	-1,92	-1,90	-0,02	±1,4
800,00	0,041435	93,20	-0,78	-0,80	0,02	±1,4
1000,00	0,041459	94,00	0,01	0,00	0,01	±1,1
1250,00	0,041475	94,60	0,61	0,60	0,01	±1,4
1600,00	0,041491	95,00	1,00	1,00	0,00	±1,6
2000,00	0,041484	95,20	1,21	1,20	0,01	±1,6
2500,00	0,041500	95,30	1,30	1,30	0,00	±1,6
3150,00	0,041491	95,20	1,20	1,20	0,00	±1,6
4000,00	0,041475	94,90	0,91	1,00	-0,09	±1,6
5000,00	0,041459	94,50	0,51	0,50	0,01	±2,1

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7.4. Frekans Ağırlıklı - Elektriksel Test
Frequency Weighted Electrical Test

Frekans Frequency Hz	Uygulanan Voltaj Applied Voltage V	Okunan Ses Seviyesi Measured Sound Level dB	Tepki Farkı Response Difference dB	A-Ağırlıklı Filtre Karakteristiği A-Weighted Filter Characterization dB	Tepki Farkı Sapma Response Deviation dB	Tolerans Tolerance dB
6300,00	0,041445	93,80	-0,19	-0,10	-0,09	+2,1; -2,6
8000,00	0,041458	92,60	-1,39	-1,10	-0,29	+2,1; -3,1
10000,00	0,041360	90,90	-3,07	-2,50	-0,57	+2,6; -3,6
12500,00	0,041274	88,60	-5,35	-4,30	-1,05	+3,0; -6,0
16000,00	0,041171	84,80	-9,13	-6,60	-2,53	+3,5; -17,0
20000,00	0,041052	79,50	-14,40	-9,30	-5,10	+4,0; -∞

7.5. Elektriksel Seviye Doğrusallığı Testi
Electrical Level Linearity Test

Frekans Frequency Hz	Uygulanan Voltaj Applied Voltage V	Referans Ses Seviyesi Reference Sound Level dB	Okunan Ses Seviyesi Measured Sound Levels dB	Sapma Deviation dB	Tolerans Tolerance dB
8000,00	0,041398	94,00	94,00	0,00	+2,1; -3,1
8000,00	0,073617	99,00	99,00	0,00	+2,1; -3,1
8000,00	0,130920	104,00	104,00	0,00	+2,1; -3,1
8000,00	0,232740	109,00	109,00	0,00	+2,1; -3,1
8000,00	0,413880	114,00	114,00	0,00	+2,1; -3,1
8000,00	0,736050	119,00	117,40	-1,60	+2,1; -3,1
8000,00	0,825830	120,00	117,90	-2,10	+2,1; -3,1
8000,00	0,926540	121,00	118,50	-2,50	+2,1; -3,1
8000,00	1,039700	122,00	119,00	-3,00	+2,1; -3,1
8000,00	1,166600	123,00	119,60	-3,40	+2,1; -3,1
8000,00	1,308800	124,00	120,10	-3,90	+2,1; -3,1
8000,00	0,041399	94,00	94,00	0,00	+2,1; -3,1
8000,00	0,023281	89,00	89,00	0,00	+2,1; -3,1
8000,00	0,013111	84,00	83,90	-0,10	+2,1; -3,1
8000,00	0,007362	79,00	78,90	-0,10	+2,1; -3,1
8000,00	0,004140	74,00	73,90	-0,10	+2,1; -3,1
8000,00	0,002324	69,00	68,90	-0,10	+2,1; -3,1
8000,00	0,001307	64,00	63,90	-0,10	+2,1; -3,1
8000,00	0,000730	59,00	58,90	-0,10	+2,1; -3,1
8000,00	0,000412	54,00	53,90	-0,10	+2,1; -3,1
8000,00	0,000229	49,00	48,90	-0,10	+2,1; -3,1
8000,00	0,000201	48,00	47,90	-0,10	+2,1; -3,1
8000,00	0,000183	47,00	46,90	-0,10	+2,1; -3,1
8000,00	0,000164	46,00	45,90	-0,10	+2,1; -3,1
8000,00	0,000144	45,00	44,90	-0,10	+2,1; -3,1

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7.5. Elektriksel Seviye Doğrusallığı Testi

Electrical Level Linearity Test

Frekans	Uygulanan Voltaj	Referans Ses Seviyesi	Okunan Ses Seviyesi	Sapma	Tolerans
Frequency	Applied Voltage	Reference Sound Level	Measured Sound Levels	Deviation	Tolerance
Hz	V	dB	dB	dB	dB
8000,00	0,000127	44,00	43,90	-0,10	+2,1; -3,1

8. Uygunluk Beyanı

Statement of Compliance

Ölçüm sonuçları ve ölçüm belirsizliği yukarıda verilmiştir. Kullanıcı bunları dikkate alarak uygunluğuna karar vermelidir. Beyan edilen genişletilmiş belirsizlik değeri standart belirsizliğin normal dağılımı için; yaklaşık % 95 güvenirlilik seviyesini sağlayan $k=2$ kapsam faktörü ile çarpımının sonucudur. Standart ölçüm belirsizliği GUM ve EA-4/02 dokümanlarına uygun olarak belirlenmiştir. Ölçüm sonuçları, genişletilmiş ölçüm belirsizlikleri ve kalibrasyon metotları bu sertifikanın tamamlayıcı bir bölümüdür.

The measurement results and measurement uncertainty were given. The user have to consider the results and decide compliance of the device. The reported expanded uncertainty of measurement is stated as the standart uncertainty of multitude by coverage factor $k=2$, which for a normal distribution corresponds to coverage of approximately 95%. The standart measurement uncertainty is defined according to the GUM and EA-4/02 documents. Measurement results, the expanded measurement uncertainty of measurement and calibration methods, is an integral part of the this certificate.

9. Açıklamalar

Remarks

Bu sertifikada bulunan sonuçlar cihazın kalibrasyon tarihindeki durumu kapsar ve uzun dönem kararlılığı hakkında bir öngörü içermez.

The result reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument

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CEL 110/1 - CALIBRATION CERTIFICATE OF CALIBRATORS

 AVL Kalibrasyon Laboratuvarı		TÜRKAK TÜRK AKREDİTASYON KURUMU TURKISH ACCREDITATION AGENCY tarafından akredite edilmiştir.			
		AVL AKUSTİK VİBRASYON KALİBRASYON LABORATUVARI İvedik O.S.B. 1365. Sk. No: 10 OSTİM / ANKARA		Kalibrasyon TS EN ISO/IEC 17025 AB-0089-K	
				AB-0089-K 2015-1508 11-2015	
<i>Kalibrasyon Sertifikası</i> Calibration Certificate					
Cihazın Sahibi Customer Name	:	SELİN ÖLÇÜM LAB. HİZM. BİL. MÜH. MÜŞ. İNŞ. SAN. VE TİC. A.Ş.			
İstek Numarası Order No.	:	Çetinemeç Bulvarı 1324. Cadde No.30/C Öveçler Dikmen / ANKARA			
Makine / Cihaz Instrument / Device	:	Ses Kalibratörü Sound Calibrator			
İmalatçı Manufacturer	:	CASELLA			
Tip Type	:	Cel-110/1			
Seri Numarası Serial number	:	117566			
Kalibrasyon Tarihi Date of calibration	:	10.11.2015			
Sertifika Sayfa Sayısı Number of pages of the certificate	:	3			
Bu kalibrasyon sertifikası, Uluslararası Birimler Sisteminde (SI) tanımlanmış birimleri realize eden ulusal ölçüm standartlarına izlenebilirliği belgeler. This calibration certificate documents the traceability to national standards, which realize the unit of measurement according to the International System of Units (SI). Türk Akreditasyon Kurumu (TÜRKAK) kalibrasyon sertifikalarının tanınması konusunda Avrupa Akreditasyon Birliği (EA) ve Uluslararası Laboratuvar Akreditasyon Birliği (ILAC) ile karşılıklı tanınma antlaşmasını imzalamıştır. The Turkish Accreditation Agency (TÜRKAK) is signatory to the multilateral agreements of the European co-operation for the Accreditation (EA) and of the International Laboratory Accreditation (ILAC) for the Mutual recognition of calibration certificates. Ölçüm sonuçları, genişletilmiş ölçüm belirsizlikleri ve kalibrasyon metodları bu sertifikanın tamamlayıcı kısmı olan takip eden sayfalarda verilmiştir. The measurements, the uncertainties with confidence probability and calibration methods are given on the following pages which are part of this certificate.					
Mühür 	Tarih Date 10.11.2015	Kalibrasyonu Yapan Calibrator Ayşegül Batmaz	Laboratuvar Müdürü Head of the Calibration Laboratory Younes NEVAYE SHIRAZI		

Bu sertifika, laboratuvarın yazılı izni olmadan kısmen kopyalanıp çoğaltılamaz.
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KALİBRASYON LABORATUVARI

AB-0089-K

2015-1508

11-2015

1. Cihazın Ait Bilgiler

Device to be Calibrated

Cihazın Adı : Ses Kalibratörü
Name of the Instrument : Sound Calibrator
İmalatçısı : CASELLA
Manufacturer
Seri Numarası : 117566
Serial Number
Ölçüm Aralığı : 1000 Hz 94 dB / 114 dB
Measuring Range
Tipi : Cel-110/1
Type

2. Cihazın Laboratuvara Kabul Tarihi : 04.11.2015
Date of Receipt of Device

3. Kalibrasyon Metodu
Calibration Method

Kalibrasyon TS EN 60942 standardına uygun olarak karşılaştırma metodu ile yapılmıştır.

4. Çevresel Şartlar

Environmental Conditions

Ortam Sıcaklığı : 20,6 ± 3 °C
Ambient Temperature
Bağıl Nem : 60 ± 25 %
Relative Humidity
Ortam Basıncı : 915 ± 1 hPa
Ambient Pressure

5. Kalibrasyonda Kullanılan Referans Cihazlar

Reference Equipments Used During Calibration

Cihaz Device	İmalatçı Manufacturer	Seri No Serial No	Tipi Type	Sertifika No Certificate No	İzlenebilirlik Traceability
Mikrofon	G.R.A.S	162716 - 210532	40AG - 26TK	1076	Spektra
Akustik Kalibratör	Brüel & Kjaer	2705957	4231	0530	Spektra
Termo - Hygrometre	KIMO	7122852	KH100	5.02209-D	UMS

6. Ölçüm Belirsizliği

Measurement Uncertainty

6.1. 94 db 1000 Hz

Ses Basınç Seviyesi : 0,14 dB
Sound Pressure Level
Ses Frekansı : 0,10 %
Sound Frequency
Bozulma Faktörü : 0,38 %
Distortion Factor

6.2. 114 db 1000 Hz

Ses Basınç Seviyesi : 0,14 dB
Sound Pressure Level
Ses Frekansı : 0,10 %
Sound Frequency
Bozulma Faktörü : 0,88 %
Distortion Factor

SRT.LBBR.504



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7. Kalibrasyon Sonuçları

Calibration Results

7.1. 94 db 1000 Hz

Ses Basınç Seviyesi

Sound Pressure Level

Nominal Değer : 94,08 dB

Nominal Value

Ölçülen Değer : 93,97 dB

Measured Value

Sapma : -0,11 dB

Deviation

Ses Frekansı

Sound Frequency

Nominal Değer : 1000,01 Hz

Nominal Value

Ölçülen Değer : 1000,14 Hz

Measured Value

Sapma : 0,13 Hz

Deviation

Bozulma Faktörü

Distortion Factor

Ölçülen Değer : 0,32 %

Measured Value

Referans Ses Basıncı : 20 µPa

Reference Sound Pressure

7.2. 114 db 1000 Hz

Ses Basınç Seviyesi

Sound Pressure Level

Nominal Değer : 114,10 dB

Nominal Value

Ölçülen Değer : 113,96 dB

Measured Value

Sapma : -0,14 dB

Deviation

Ses Frekansı

Sound Frequency

Nominal Değer : 1000,01 Hz

Nominal Value

Ölçülen Değer : 1000,12 Hz

Measured Value

Sapma : 0,11 Hz

Deviation

Bozulma Faktörü

Distortion Factor

Ölçülen Değer : 0,48 %

Measured Value

8. Uygunluk Beyanı

Statement of Compliance

Ölçüm sonuçları ve ölçüm belirsizliği yukarıda verilmiştir. Kullanıcı bunları dikkate alarak uygunluğuna karar vermelidir. Beyan edilen genişletilmiş belirsizlik değeri standart belirsizliğin normal dağılımı için; yaklaşık % 95 güvenirlilik seviyesini sağlayan k=2 kapsam faktörü ile çarpımının sonucudur. Standart ölçüm belirsizliği GUM ve EA-4/02 dokümanlarına uygun olarak belirlenmiştir. Ölçüm sonuçları, genişletilmiş ölçüm belirsizlikleri ve kalibrasyon metotları bu sertifikanın tamamlayıcı bir bölümüdür.

The measurement results and measurement uncertainty were given. The user have to consider the results and decide compliance of the device. The reported expanded uncertainty of measurement is stated as the standart uncertainty of multitude by coverage factor k=2, which for a normal distribution corresponds to coverage of approximately 95%. The standart measurement uncertainty is defined according to the GUM and EA-4/02 documents. Measurement results, the expanded measurement uncertainty of measurement and calibration methods, is an integral part of the this certificate.

9. Açıklamalar

Remarks

Bu sertifikada bulunan sonuçlar cihazın kalibrasyon tarihindeki durumu kapsar ve uzun dönem kararlılığı hakkında bir öngörü içermez.

The result reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument

SRT.LBBR.504



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APP-3
DOCUMENTS OF THE PERSONNEL WHO PREPARED THE REPORT AND MADE THE MEASUREMENT

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TMMOB FİZİK MÜHENDİSLERİ ODASI BAŞARI BELGESİ

Sayın İsmail ARSLAN

TMMOB Fizik Mühendisleri Odası ile Çevre ve Orman Bakanlığı işbirliği ile 2-5 Nisan 2009 tarihleri arasında Fizik Mühendisleri Odası Genel Merkezi'nde gerçekleştirilen

“A-2 Tipi Mühendislik Akustigi”

Sertifika Programına katılarak “BAŞARILI” olmuştur .

A. ZARARSIZ
Dr. Abdullah ZARARSIZ
Yönetim Kurulu Başkanı

Belge Kodu: FMO1 Belge No: 14 Veriliş Tarihi: 5 Nisan 2009

This report is only valid for the **NOISE** measurements performed on 11.12.2015 – 12.12.2015 in the scope of **AGE Batum LTD – Shuakhevi HEPP Project** and **cannot be copied without the written permission of SELİN Measurement Laboratory Co. Inc.** Reports without sign and seal are invalid. Measurement results are only related to operation conditions during measurement. Our accreditation is restricted with the scope of the experiment methods in our scope. Competence of the opinions and interpretations stated except this is not in the scope of the accreditation. This report cannot be used for official procedures related to environmental legislation.

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TMMOB FİZİK MÜHENDİSLERİ ODASI BAŞARI BELGESİ



Sayın Murat DİNÇ
(T.C.Kimlik No: 10370238026)

TMMOB Fizik Mühendisleri Odası ile Çevre ve Orman Bakanlığı işbirliği ile 17-18 Aralık 2011 tarihleri arasında Fizik Mühendisleri Odası Genel Merkezi'nde gerçekleştirilen

“ A-1 Tipi Temel Eğitim ve Saha Ölçümleri ”

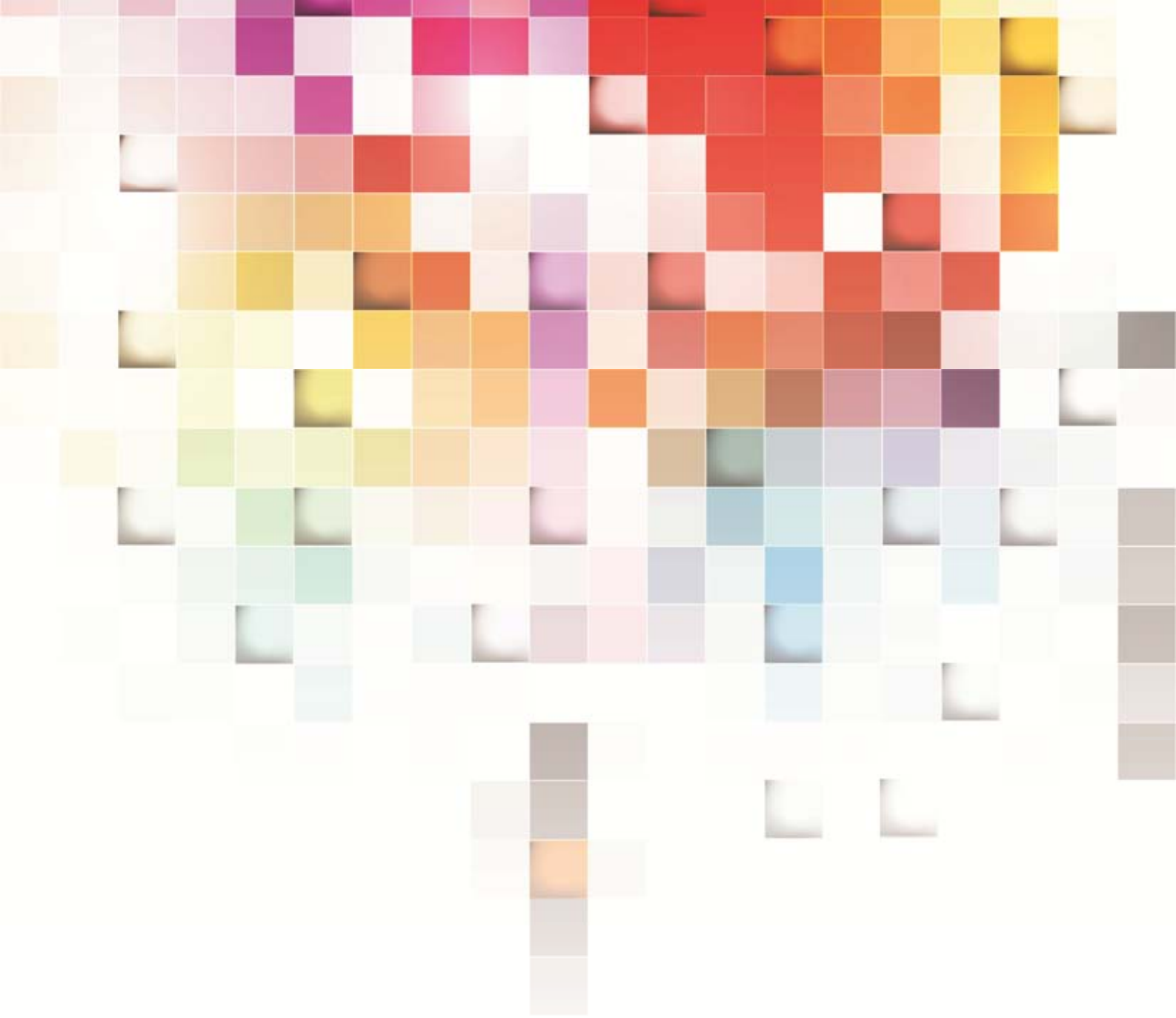
Sertifika Programına katılarak “BAŞARILI” olmuştur .

A. Zeynep
Dr. Abdülkadir ZARARSIZ
Yönetim Kurulu Başkanı

Belge Kodu: F/MO1 Belge No:85 Veriliş Tarihi: 18 Aralık 2011

This report is only valid for the **NOISE** measurements performed on **11.12.2015 – 12.12.2015** in the scope of **AGE Batum LTD – Shuakhevi HEPP Project** and **cannot be copied without the written permission of SELİN Measurement Laboratory Co. Inc.** Reports without sign and seal are invalid. Measurement results are only related to operation conditions during measurement. Our accreditation is restricted with the scope of the experiment methods in our scope. Competence of the opinions and interpretations stated except this is not in the scope of the accreditation. This report cannot be used for official procedures related to environmental legislation.

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Selin Lab
www.selinlab.com.tr

SELİN ÖLÇÜM LABORATUVAR HİZMETLERİ BİLİŞİM MÜH.MÜŞ. İNŞ. SAN. VE TİC. A.Ş.

Adres: Çetin Emeç Bulvarı 1324. Cadde Özlem Apartmanı No:30/C Öveçler, Çankaya / ANKARA
E-mail: selinlab@selinlab.com.tr

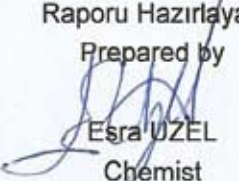
Tel: 0 312 472 94 35-36-37
Faks: 0 312 481 33 01

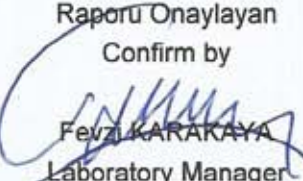
 SEGAL		SEGAL ÇEVRE ÖLÇÜM ve ANALİZ LABORATUARI Aşağı Öveçler Mah. 1322.Cad (eski 6.cad) ÇANKAYA-ANKARA Tel: 0 312 481 83 00 Fax: 0 312 481 83 99 mail: segal@segalanaliz.com web: www.segalanaliz.com www.segal.com.tr	Report Number R-17945/12
			Report Date 24.12.2015
İlk Basım: 03.05.2010 RP.01 / Rev.01 Rev. Tarihi: 20.01.2011 Sayfa 1 / 2			

Müşterinin adı/ adresi: Customer Name / Address	SELİN İNŞ. TURZ. MÜŞ. SAN. ve TİC. LTD. ŞTİ. Aşağı Öveçler Mah. 1042.Cad. 1335. Sk. No:20/10 Dikmen/ANKARA
<u>Numuneyi Alan Kurum / Kuruluş</u> <u>Sampler Institution / Company</u>	SELİN İNŞ. TURZ. MÜŞ. SAN. ve TİC. LTD. ŞTİ.
Numunenin Adı ve Örnekleme Tarihi: Name and Sampling Date of the Sample	Wastewater (N-19506/15)
Numunenin Alınış Şekli: Receipt of the Sample Shape	---
Numuneyi Teslim Eden: Deliverer of the Sample	The sample was delivered by the customer.
Proje Adı ve No: Name and Number of the Project	P-9394/15
Numunenin Kabul Tarihi: Date of Sample Acceptance	18.12.2015
Numunenin Teslim Koşulları: Delivery Conditions of the Sample	Glass container
Açıklamalar: Remarks	The analysis of the sample from Kichivari main kamp
Deneyin yapıldığı Tarih: Date of the Test	18.12.2015 – 23.12.2015
Raporun Sayfa Sayısı: Number of the Pages of the Report	2 pages

"This report is not used for officially in terms of enviromental legislation."

Deney ve/veya ölçüm sonuçları, genişletilmiş ölçüm belirsizlikleri ve deney/ölçüm metotları takip eden sayfalarda verilmiştir. The test and /or measurements results, the uncertainties with confidence probability and test methods are given on the following pages which are part of this report.

Raporu Hazırlayan
Prepared by

Esra UZEL
Chemist

Raporu Onaylayan
Confirm by

Fevzi KARAKAYA
Laboratory Manager



Bu rapor, laboratuvarın yazılı izni olmadan kısmen kopyalanıp çoğaltılamaz. İmzasız ve mühürlü raporlar geçersizdir. Sonuçlar sadece deneyi yapılan numunelere aittir. (This report shall not be reproduced other than in full except with the permission of the laboratory. Testing reports without signature and seal are not valid. The results belong to the tested sample.)

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			Report Date 24.12.2015
İlk Basım: 03.05.2010 RP.01 / Rev.01 Rev. Tarihi: 20.01.2011 Sayfa 2 / 2			

NUMUNE ADI ve NUMUNE NO: Wastewater– N-19506/15
SAMPLE NAME and NUMBER

Parametre-Birim Parameter-Unit	Analiz Sonucu Test Result	SKKY tablo 21.1 Limit values Composite 2 hour	IFC Genel ÇSG Rehberleri Max. Value	Analiz Metodu Test Method
Dissolved Oxygen (mg/L)	9,29	-	-	TS EN ISO 5814
Suspended Solids (mg/L)	<10	70	50	TS EN 872
Biological Oxygen Demand (mg/L)	<4	50	30	SM 5210 B
Chemical Oxygen Demand (mg/L)	<10	180	125	SM 5220 B
Oil-Grease (mg/L)	<10	-	10	TS 8312

"Samples are preserved under the rules of TS EN ISO 5667-3 - Water quality - Sampling - Part 3: Storage and Transport of Samples. During that time the chemical, microbiological and physical perishable or hazardous samples, the sample will be destroyed without waiting for the end of the storage period."

"This report is not used for officially in terms of enviromental legislation."

Environmental Conditions:

Weather	Open	Rain	Yes	Weather Temperature °C	Coordinates	E	260171
	Close		No			N	4614687

Görüş ve Yorumlar:



Bu rapor, laboratuvarın yazılı izni olmadan kısmen kopyalanıp çoğaltılamaz. İmzasız ve mühürlü raporlar geçersizdir. **Sonuçlar sadece deneyi yapılan numunelere aittir.** (This report shall not be reproduced other than in full except with the permission of the laboratory. Testing reports without signature and seal are not valid. **The results belong to the tested sample.**)