PROGRAMME SPECIFICATION	

1	**Awarding Institution**	Newcastle University
2	**Teaching Institution**	Newcastle University
3	**Final Award**	MSc / PGDip
4	**Programme Title**	Environmental Biogeochemistry
5	**Programme Code**	5035/3323
6	**Programme Accreditation**	JBM
7	**QAA Subject Benchmark(s)**	Engineering
8	**FHEQ Level**	7
9	**Last updated**	July 2010

10 Programme Aims

The primary purpose of this programme is to provide biology, chemistry, and Earth and environmental science graduates with the advanced conceptual understanding, detailed factual knowledge, and specialist technical skills appropriate for them to follow successful careers as technically aware scientists in the environmental industry. The training given also forms an excellent introduction to environmental geochemistry for those students wishing to follow a research oriented career path.

Specifically, the course aims to provide an advanced understanding of:

1 The low temperature geochemistry of waters, soils and sediments.
2 The fundamental role played by micro-organisms in catalysing low temperature geochemical reactions.
3 The origins, toxicity and ultimate fates of pollutants.
4 Modern techniques for the analysis of environmental materials.

In addition to these academic and technical skills, the course also aims to equip its graduates with a suite of key skills, including the ability to communicate effectively, the ability to employ IT and library resources appropriately, the ability to prioritise work and to meet deadlines, the ability to work alone and with others, and the ability to use initiative and to solve problems.

The course aims to meet the descriptors, for a qualification at Masters (M) level, published by the Framework for Higher Education Qualifications in England, Wales and Northern Ireland.

11 Learning Outcomes

The programme provides opportunities for students to develop and demonstrate knowledge and understanding, qualities, skills and other attributes in the following areas (compulsory modules in bold text, optional modules in normal, italic text). The programme outcomes have references to the benchmark statements for (Engineering) (E).

A1	An advanced knowledge and understanding of the low temperature geochemistry of waters, soils & sediments	**CEG8605,** *CEG8511*, **CEG8602, (CEG8699)**
A2	A knowledge and understanding of the physiology and diversity of micro-organisms, and an advanced knowledge of their roles in the environment and the biochemical pathways by which they degrade some important pollutant classes	**CEG8604,** *CEG8609*, **(CEG8699)**
A3	An advanced knowledge and understanding of the origin, toxicity and fate of key organic and inorganic	**CEG8606**, *CEG8609*, **(CEG8699)**

	pollutants	
A4	An understanding of key pieces of environmental legislation	*CEG8610, CEG8608,* **(CEG8699)**
A5	An understanding of modern approaches to pollution and pollution control	*CEG8609***,** *CEG8610, CEG8511, CEG8608,* **(CEG8699)**
A6	An understanding of the principles, applications and limitations of modern environmental analytical techniques, and an advanced understanding of some of these techniques	**CEG8602, CEG8603, (CEG8699)**
B1	Critically assess the quality of data generated by analytical geochemical techniques	**CEG8602, CEG8603,** *CEG8609* **(CEG8699)**
B2	Present and summarise such data, and to critically appraise its significance, using appropriate statistical techniques	**CEG8602, CEG8603,** *CEG8609***, CEG8601 (CEG8699)**
B3	Critically assess the value and limitations of existing information on a given subject	**CEG8602, CEG8603,** *CEG8609***, (CEG8699)**
B4	Formulate or recognise key hypotheses, to test hypotheses using logical and consistent quantitative or qualitative arguments, and to identify key data which allow such tests to be made	**CEG8602, CEG8603,** *CEG8609***, (CEG8699)**
B5	Critically assess the value and limitations of new data in relation existing information on a given subject, to draw logical conclusions, and to identify appropriate avenues for further study	**CEG8602, CEG8603,** *CEG8609***, (CEG8699)**
B6	Solve problems	**CEG8602, CEG8603,** *CEG8609***, (CEG8699)**
C1	Demonstrate an understanding of the principles, applications and limitations of modern environmental analytical techniques, and an advanced understanding of some of these techniques	**CEG8602, CEG8603,** *CEG8609***, (CEG8699)**
C2	Develop practical experience of a range of modern biogeochemical analytical techniques, and advanced experience of some of these techniques	**CEG8602, CEG8603,** *CEG8609***, (CEG8699)**
C3	Demonstrate the ability to critically assess the quality of the analytical data generated by these techniques	**CEG8602, CEG8603,** *CEG8609,* **(CEG8699)**
C4	Demonstrate the ability to present and summarise such data, and to critically appraise its significance, using appropriate statistical techniques	**CEG8602, CEG8603,** *CEG8609***,GEG8601, (CEG8699)**
D1	Communicate by means of well prepared, clear and confident presentations and concise and grammatical written documents	**CEG8601, CEG8608, CEG8609, CEG8607, CEG8605, (CEG8699)**
D2	To use library and other information sources skilfully and appropriately	**CEG8601, CEG8699, (CEG8699)**
D3	To use IT resources skilfully and appropriately	**CEG8601, CEG8608, CEG8699, (CEG8699)**
D4	To plan, organise and prioritise work activities in order to meet deadlines	**CEG8601, CEG8608, CEG8699, (CEG8699)**
D5	To work independently, with initiative, and also in teams	**CEG8602, CEG8603, CEG8608,** *CEG8609***, (CEG8699)**
D6	To solve problems	**CEG8601, CEG8602, CEG8603, CEG8608,** *CEG8609***, (CEG8699)**

Knowledge and Understanding

On completing the programme students should have gained and be able to demonstrate:

A1 An advanced knowledge and understanding of the low temperature geochemistry of waters, soils & sediments

A2 A knowledge and understanding of the physiology and diversity of micro-organisms, and their roles in the environment.

A3 A knowledge and understanding of the origin, toxicity and fate of key organic and inorganic pollutants

A4 A knowledge and understanding of modern approaches to pollution and pollution control

A5 A knowledge of the principles, applications and limitations of modern environmental analytical techniques, and an advanced understanding of some of these techniques

A6 A knowledge and understanding of key pieces of environmental legislation

Teaching and Learning Methods

Teaching

Specialist technical knowledge and understanding (A1-A6) are primarily imparted via lecture classes, often supported by web-based reference materials. The key chemical and microbiological concepts (A1 and A2) are addressed in CEG8605 (Aqueous Geochemistry) and CEG8604 (Introduction to Microbiology, Microbial Physiology and Biogeochemistry). Outcome A3 is taught through CEG8606 (Sources and Fate of Pollutants) whilst A4 and A6 are addressed in later modules such as CEG8609 (Microbial Transformations of Organic Pollutants) and CEG8608 (Contaminated Land). An understanding of modern analytical techniques is provided in CEG8602 and CEG8603 (Inorganic Analytical Geochemistry and Organic Analytical Geochemistry). The importance of microbial catalysis in many low temperature geochemical reactions is emphasised, as is training in Research Methods, CEG8601.

Knowledge and understanding are further promoted, where appropriate, by case studies (A3; CEG8606), computer-modelling workshops (A1, A5; CEG8605, CEG8608), field trips (A1, A5, A6; CEG8602) and site visits (A3, A5; CEG8606, CEG8610).

Learning

Throughout the taught component of the course, students are encouraged and expected to engage in independent reading, and are supported in this by the provision of individual module reading lists. Short tests at the end of each module (ten-minute-tests) enable students to monitor the progress of their learning. Reflection on case studies (A3; CEG8606), active participation in modelling workshops (A1, A5; CEG8605, CEG8608), and observations and discussions during field trips (A1, A5, A6; CEG8602) and site visits (A3, A5; CEG8606, CEG8610) aid the development of understanding.

Assessment Strategy

Knowledge and understanding (A1-A6) are assessed by a combination unseen written examinations and coursework. Both employ a range of approaches in order to accurately assess student abilities. Written papers include essay, calculation, and multi-part questions whilst assessed coursework comprises geochemical calculations, essays, laboratory and technical reports, and group projects and presentations. Some, or all, of A1-A6 (depending on topic) are also examined by means of a dissertation and presentation and possibly (at the discretion of an External Examiner) by *viva voce* examination.

Intellectual Skills

On completing the programme students should be able to:

B1 Critically assess the quality of data generated by analytical geochemical techniques

B2 Present and summarise such data, and to critically appraise its significance, using appropriate statistical techniques

B3 Critically assess the value and limitations of existing information on a given subject

B4 Formulate or recognise key hypotheses, to test hypotheses using logical and consistent quantitative or qualitative arguments, and to identify key data which allow such tests to be made

B5 Critically assess the value and limitations of new data in relation existing information on a given subject, to draw logical conclusions, and to identify appropriate avenues for further study

B6 Solve problems

Teaching and Learning Methods

Teaching
Intellectual skills B1-B6 are developed during the CEG8602, CEG8603 and CEG8609 mini-projects: B3, B4, and B6 in the initial desk-based research and planning phases; B6 during sample collection and analysis; and B1, B2, B5 and B6 in the subsequent interpretative workshops. Elsewhere in the programme, CEG8699 addresses B1 and CEG8601 addresses B2, whilst modelling workshops, exercises on field trips and attendance at School research seminars enable skills B3-B6 to be developed further. All such skills are exercised significantly during the course of the CEG8699 dissertation project, the completion of which is supported by a series of dissertation-related workshops.

Learning
Students are encouraged to acquire intellectual skills during the CEG8602, CEG8603 and CEG8609 mini-projects by analysis of information gathered about the site during the desk-based research phase (B3); by designing a sampling and analysis strategy for the site, which addresses the issues identified (B4); by appraising the quality of the data collected (B1, B2); and by reflection upon the value of these data, and upon the conclusions to which the data lead (B5). Problem solving skills (B6) are employed at all stages (planning, field and laboratory work, interpretation). The lengthy dissertation project (CEG8699) encourages the development of intellectual skills by similar means as the mini-project, but at a more advanced academic level.

Assessment Strategy

Intellectual skills (B1-B6) are assessed by means of coursework (calculations, essays, laboratory and technical reports, and group projects and presentations), and unseen written examinations. Some, or all, of B1-B6 (depending on topic) are also examined by means of a dissertation and presentation and possibly (at the discretion of an External Examiner) by *viva voce* examination.

Practical Skills

On completing the programme students should be able to:
C1 Demonstrate an understanding of the principles, applications and limitations of modern environmental analytical techniques, and an advanced understanding of some of these techniques

C2 Develop practical experience of a range of modern biogeochemical analytical techniques, and advanced experience of some of these techniques

C3 Demonstrate the ability to critically assess the quality of the analytical data generated by these techniques

C4 Demonstrate the ability to present and summarise such data, and to critically appraise its significance, using appropriate statistical techniques

Teaching and Learning Methods

Teaching
Understanding and experience of the geochemical and microbiological techniques used in the study of environmental materials (C1, C2), are provided in the laboratory mini-projects of CEG8602, CEG8603 and CEG8609 (Inorganic Analytical Geochemistry, Organic Analytical Geochemistry and Microbial Transformations of Organic Pollutants respectively). These consist of a series of desk, field and laboratory practical classes, supplemented by lectures, and focussed on the geochemistry of one or more local sites. Within the mini-projects, workshops and lectures also provide training in the assessment of data quality (C3) and in data presentation and appraisal (C4). CEG8601 (Research Methods) and a series of dissertation-related summer workshops further address C3 and C4. More advanced training in some or all of skills C1-C4 is provided, on an individual basis, during an 18 week dissertation project (CEG8699) in which the student usually works within one of CEG's research groups.

Learning
Students are encouraged to acquire skills C1-C4 through active participation in the field sampling, experimental, and interpretative aspects, of the CEG8602, CEG8603 and CEG8609 mini-projects. Learning is reinforced, and further developed, as students apply their new skills to the analysis of environmental materials, and to the appraisal and presentation of the resulting data, in their dissertation projects.

Assessment Strategy

Subject specific and practical skills (C1-C4) are assessed by means of coursework reports and by unseen written examination. Some, or all, of C1-C4 (depending on topic) are also examined by means of a dissertation and presentation and possibly (at the discretion of an External Examiner) by *viva voce* examination.

Transferable/Key Skills

On completing the programme students should be able to:

D1 Communicate by means of well prepared, clear and confident presentations and concise and grammatical written documents

D2 Use library and other information sources skilfully and appropriately

D3 Use IT resources skilfully and appropriately

D4 Plan, organise and prioritise work activities in order to meet deadlines

D5 Work independently, with initiative, and also in teams

D6 Solve problems

Teaching and Learning Methods

Teaching
Management of workload in order to meet deadlines (D4) is also promoted by means of a strict coursework timetable and the writing of a project inception report (CEG8601), whilst team-working skills (D5) are developed by group exercises in the CEG8602, CEG8603, CEG8608 and CEG8609 mini-projects. This also provides opportunities for students to improve their problem solving abilities (D6), and to extend their communication, library, IT, and time management skills (D1-D4). The 18 week CEG8699 dissertation project, and associated workshops, provides students with further opportunities to develop all of these skills (D1-D6).

Learning
Participation in the team components of the CEG8602, CEG8603, CEG8608 and CEG8609 mini-projects (e.g. whilst researching a site and planning a sampling strategy) allows students to improve their team-working skills (D5), whilst developing solutions to problems arising during field and laboratory work assists in the advancement of students' problem solving abilities (D6). Within the mini-projects, students improve their communication, library, IT, and time management skills (D1-D4) by researching the site (D2, D3), communicating their information to their colleagues (D1, D3), manipulating the data generated (D3), and reporting their findings in a timely fashion (D1, D4). The dissertation project (CEG8699) provides similar opportunities for skill development through the construction of a research plan for the dissertation (D4), during the literature searching and data handling components (D2, D3), as the field and laboratory work is performed (D5, D6), and by participation in the dissertation workshops (D1, D3).

Assessment Strategy

Key skills (D1-D4) are assessed via written examinations, the production of a research brief (CEG8601), and the giving of short presentation in CEG8699. Communication (D1), library (D2) and IT (D3) skills, and the ability to meet deadlines (D4) work independently (D5) and solve problems (D6) are indirectly assessed by other coursework items (geochemical calculations, essays, laboratory and technical reports, and group projects and presentations), and all key skills (D1-D6) are examined by means of a dissertation and presentation, and possibly (at the discretion of an External Examiner) by *viva voce* examination.

12 Programme Curriculum, Structure and Features

Basic structure of the programme

This is a one-year full-time modular programme. It consists of two parts: a 100-credit *taught component*, which runs from late September until Easter, and an 80-credit *research project*, for which a dissertation is submitted in mid-August. Successful completion of the taught component is required in order for a student to progress to the dissertation project.

The taught component of the course consists of 10 compulsory modules. Each 10-credit module equates to 100 hours of learning time.

The CEG8699 18 week research project, commencing in mid-April, enables students to apply the subject specific skills and understanding (intended learning outcomes A1-A6), the intellectual skills (intended learning outcomes B1-B6), the practical skills (intended learning outcomes C1-C4) and the transferable/key skills (intended learning outcomes D1-D6) gained during the taught component, to a geochemical research problem. Dissertations often involve a significant laboratory component, but may take the form of desk or literature studies, or modelling work.

Key features of the programme (including what makes the programme distinctive)

An innovative feature is that the technical modules are taught in short (generally two-week) blocks. These occupy students, largely full-time, until the module has been completed and students then progress to the next module. This structure enhances student learning by

allowing later units to build on the concepts, knowledge and skills gained during those taught earlier. The programme has a large practical component which is taught in CEG8602, CEG8603 and CEG8609 (Inorganic Analytical Geochemistry, Organic Analytical Geochemistry and Microbial Transformations of Organic Pollutants respectively).
During the project, students are usually based in the School, working alongside PhD students and post-doctoral research associates in one of our established research groups, but the dissertation might entail working elsewhere, in collaboration with another industrial or academic partner. We encourage and support students who wish to publish the results of their dissertations, and several past M.Sc. students have been successful in this area.

Programme regulations (link to on-line version)

http://www.ncl.ac.uk/regulations/programme/

13 Criteria for admission

Entry qualifications
A 2nd class degree from a UK University, or its overseas equivalent, is the minimum qualification for entry. Preferred first degree subjects are chemistry, Earth science, environmental science, environmental engineering, or microbiology, but other relevant science degrees may also be acceptable.

Admissions policy/selection tools
Upon receipt of a completed application, offers of places are made to suitably qualified candidates. These offers are conditional upon the applicant achieving a minimum of a 2nd class degree (if they do not hold such a degree at the time of the application), and upon the provision of a satisfactory reference (if one has not already been provided). UK-based applicants are invited to visit the School, to meet current students, and to attend an informal interview. NERC studentships (5 awards), and any other funding, are awarded on a competitive basis, taking degree grade (actual or predicted), reference, experience and interview performance into account. Applicants not based in the UK are not required to attend an interview.

Non-standard Entry Requirements
Applicants who hold non-standard qualifications, and/or have relevant experience equivalent to a UK 2nd Class Honours degree or better, will be considered on an individual basis.

Additional Requirements
Chemistry at A level or evidence of having studied bio/geo/chemistry during the first degree is preferred.

Level of English Language capability
Applicants for whom English is not a first language must provide evidence of a satisfactory command of English, preferably by means of a TOEFL score of 575 or greater, or by an IELTS score of 6.5 or greater.

14 Support for Student Learning

The Student Services portal provides links to key services and other information and is available at: *http://www.ncl.ac.uk/students/*

Induction
During the first week of the first semester students attend an induction programme. New students will be given a general introduction to University life and the University's principle support services and general information about the School and their programme, as described in the Degree Programme Handbook. New and continuing students will be given detailed programme information and the timetable of lectures/practicals/labs/ tutorials/etc. The International Office offers an additional induction programme for overseas students.

Study skills support
Students will learn a range of Personal Transferable Skills, including Study Skills, as outlined

in the Programme Specification. Some of this material, e.g. time management is covered in the appropriate Induction Programme. Students are explicitly tutored on their approach to both group and individual projects.

Numeracy support is available through Maths Aid and help with academic writing is available from the Writing Centre (further information is available from the Robinson Library).

Academic support
The initial point of contact for a student is with a lecturer or module leader, or their tutor (see below) for more generic issues. Thereafter the Degree Programme Director or Head of School may be consulted. Issues relating to the programme may be raised at the Staff-Student Committee, and/or at the Board of Studies.

Pastoral support
All students are assigned a personal tutor whose responsibility is to monitor the academic performance and overall well-being of their tutees. In addition the University offers a range of support services, including one-to-one counselling and guidance or group sessions / workshops on a range of topics, such as emotional issues e.g. Stress and anxiety, student finance and budgeting, disability matters etc. There is specialist support available for students with dyslexia and mental health issues. Furthermore, the Union Society operates a Student Advice Centre, which can provide advocacy and support to students on a range of topics including housing, debt, legal issues etc.

Support for students with disabilities
The University's Disability Support Service provides help and advice for disabled students at the University - and those thinking of coming to Newcastle. It provides individuals with: advice about the University's facilities, services and the accessibility of campus; details about the technical support available; guidance in study skills and advice on financial support arrangements; a resources room with equipment and software to assist students in their studies.

Learning resources
The University's main learning resources are provided by the Robinson and Walton Libraries (for books, journals, online resources), and Information Systems and Services, which supports campus-wide computing facilities.

All new students whose first language is not English are required to take an English Language Proficiency Test. This is administered by INTO Newcastle University Centre on behalf of Newcastle University. Where appropriate, in-sessional language training can be provided. The INTO Newcastle University Centre houses a range of resources which may be particularly appropriate for those interested in an Erasmus exchange.

15 Methods for evaluating and improving the quality and standards of teaching and learning

Module reviews
All modules are subject to review by questionnaires which are considered by the Board of Studies. Changes to, or the introduction of new, modules are considered at the Board of Studies and/or the School Teaching and Learning Committee. Student opinion is sought at the Staff-Student Committee and/or the Board of Studies. New modules and major changes to existing modules are subject to approval by the Faculty Teaching and Learning Committee.

Programme reviews
The Board of Studies conducts an Annual Monitoring and Review of the degree programme and reports to Faculty Teaching and Learning Committee. The FTLC takes an overview of all programmes within the Faculty and reports any Faculty or institutional issues to the University Teaching and Learning Committee.

External Examiner reports
External Examiner reports are considered by the Board of Studies. The Board responds to

these reports through Faculty Teaching and Learning Committee. External Examiner reports are shared with institutional student representatives, through the Staff-Student Committee.

Student evaluations
All modules, and the degree programme, are subject to review by student questionnaires. Informal student evaluation is also obtained at the Staff-Student Committee, and the Board of Studies. The results from student surveys are considered as part of the Annual Monitoring and Review of the programme and any arising actions are captured at programme and School / institutional level and reported to the appropriate body.

Mechanisms for gaining student feedback
Feedback is channelled via the Staff-Student Committee and the Board of Studies.

Faculty and University Review Mechanisms
The programme is subject to the University's Internal Subject Review process. Every five years degree programmes in each subject area are subject to periodic review. This involves both the detailed consideration of a range of documentation, and a two-day review visit by a review team which includes an external subject specialist in addition to University and Faculty representatives. Following the review a report is produced, which forms the basis for a decision by University Teaching and Learning Committee on whether the programmes reviewed should be re-approved for a further five year period.

Accreditation reports
Programme has been accredited as meeting the requirements for Further Learning for a Charted Engineer under the provisions of UK-SPEC for intake 2007 for candidates that have already acquired a CEng accredited BEng (Hons) undergraduate first degree.

Additional mechanisms

16 Regulation of assessment

Pass mark
The pass mark is 50%

Course requirements
Progression is subject to the University's Masters Degree Progress Regulations, Taught and Research and Examination Conventions for Taught Masters Degrees. Limited compensation up to 40 credits of the taught element and down to a mark of 40% is possible and there are reassessment opportunities, with certain restrictions.

The University employs a common marking scheme, which is specified in the Taught Postgraduate Examination Conventions, namely:

Summary description applicable to postgraduate Masters programmes		**Summary description applicable to postgraduate Certificate and Diploma programmes**	
<50	Fail	<50	Fail
50-59	Pass	50 or above	Pass
60-69	Pass with Merit		
70 or above	Pass with Distinction		

Role of the External Examiner
An External Examiner, a distinguished member of the subject community, is appointed by Faculty Teaching and Learning Committee, following recommendation from the Board of Studies. The External Examiner is expected to:

i. See and approve assessment papers
ii. Moderate examination and coursework marking

iii. Attend the Board of Examiners
iv. Report to the University on the standards of the programme

In addition, information relating to the programme is provided in:

The University Prospectus: http://www.ncl.ac.uk/postgraduate/

The School Brochure http://www.ncl.ac.uk/marketing/services/print/publications/ordering/

Degree Programme and University Regulations: http://www.ncl.ac.uk/regulations/docs/

The Degree Programme Handbook (available on the internal web page)

Please note. This specification provides a concise summary of the main features of the programme and of the learning outcomes that a typical student might reasonably be expected to achieve if she/he takes full advantage of the learning opportunities provided. The accuracy of the information contained is reviewed by the University and may be checked by the Quality Assurance Agency for Higher Education.

Annex

Mapping of Intended Learning Outcomes onto Curriculum/Modules

Intended Learning Outcome	Module codes (Compulsory in Bold)
A1	**CEG8605,** CEG8511**, CEG8602, CEG8603, (CEG8699)**
A2	**CEG8604,** CEG8609**, (CEG8699)**
A3	**CEG8606**, CEG8609, **(CEG8699)**
A4	CEG8610, CEG8608, **(CEG8699)**
A5	CEG8609**,** CEG8610, CEG8511, CEG8608, **(CEG8699)**
A6	**CEG8602, CEG8603, (CEG8699)**
B1	**CEG8602, CEG8603,** CEG8609 **(CEG8699)**
B2	**CEG8602, CEG8603,** CEG8609**, CEG8601 (CEG8699)**
B3	**CEG8602, CEG8603,** CEG8609**, (CEG8699)**
B4	**CEG8602, CEG8603,** CEG8609**, (CEG8699)**
B5	**CEG8602, CEG8603,** CEG8609**, (CEG8699)**
B6	**CEG8602, CEG8603,** CEG8609**, (CEG8699)**
C1	**CEG8602, CEG8603,** CEG8609**, (CEG8699)**
C2	**CEG8602, CEG8603,** CEG8609**, (CEG8699)**
C3	**CEG8602, CEG8603,** CEG8609, **(CEG8699)**
C4	**CEG8602, CEG8603,** CEG8609**,GEG8601, (CEG8699)**
D1	**CEG8601, CEG8608, CEG8609, CEG8607, CEG8605, (CEG8699)**
D2	**CEG8601, CEG8699, (CEG8699)**
D3	**CEG8601, CEG8608, CEG8699, (CEG8699)**
D4	**CEG8601, CEG8608, CEG8699, (CEG8699)**
D5	**CEG8602, CEG8603, CEG8608,** CEG8609**, (CEG8699)**
D6	**CEG8601, CEG8602, CEG8603, CEG8608,** CEG8609**, (CEG8699)**