WATER MANAGEMENT & WASTE WATER TREATMENT IN EGNATIA ODOS MOTORWAY

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Head of Environmental Dpt.
Egnatia Odos S.A.
EGNATIA ODOS S.A. was established in 1994

Responsible for the design, construction, maintenance, exploitation and management of one of the most complex and ambitious infrastructure projects

Highly qualified professional staff

Innovations in the management and administration of public works projects

Complete and efficient environmental strategy with respect to national resources and the implementation of advanced technologies
EGNATIA MOTORWAY & THE TRANS EUROPEAN TRANSPORT NETWORK
THE EGNATIA MOTORWAY PROJECT

1000 km of motorway
THE IDENTITY OF EGNATIA MOTORWAY

- **AXIS LENGTH:** 670 km
  (From Igoumenitsa to Kipi)

- **TECHNICAL FEATURES:**
  Dual carriageway of international standards with two traffic lanes per direction, a central reserve and an emergency lane

- **INTERCHANGES:** 63

- **ENTRANCE/EXIT OVERBRIDGES & UNDERPASSES:** 350

- **MAGOR BRIDGES:** 177 with a total length of 40 km and many smaller ones

- **TUNNELS:** 73 twin-bore up to 4,8 km long, with a total length of 50 km

- **RIVER CROSSINGS:** 43

- **PROPOSING AND FINANCING:** Archaeological excavations, protection of monuments, environmental protection works
177 major bridges, approximately 40 km long
73 twin-bore tunnels of 50km length (100km measured as single-carriageway ones)
ACCESS TO PORTS

IGOUMENITSA

KAVALA

THESSALONIKI

ALEXANDROUPOLI
PREVENTING WATER POLLUTION

PROTECTING ECOSYSTEMS

MONITORING WATER POLLUTION

LIMITING ENERGY CONSUMPTION

MONITORING AIR POLLUTION

MONITORING ROAD TRAFFIC NOISE

Environmental Protection / Sustainability
Monitoring and Management of Water Pollution
DEGREDATION OF WATER QUALITY DUE TO MOTORWAYS
WATER POLLUTION CONTROL IN EGNATIA MOTORWAY

Water Monitoring

Prevention of Water Pollution
WATER MONITORING

Sampling & Analyzing of Water

- Water bodies in the vicinity of the motorway
- Sensitive Ecosystems
- Areas influenced also by other polluting sources
<table>
<thead>
<tr>
<th>Parameters</th>
<th>Unit</th>
<th>Analysis Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fats - Oils</td>
<td></td>
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<tr>
<td>Fats &amp; Oils</td>
<td>mg/L</td>
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<tr>
<td>Temperature</td>
<td>°C</td>
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<tr>
<td>pH</td>
<td>4-10</td>
<td>APHA-AWWA-WEF, 2005-4500H+b</td>
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<tr>
<td>Conductivity</td>
<td>μS/cm</td>
<td>APHA-AWWA-WEF, 2005-2510b</td>
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<tr>
<td>Salinity</td>
<td>ppt</td>
<td>APHA-AWWA-WEF, 2005-2520b</td>
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<tr>
<td>Turbidity</td>
<td>NTU</td>
<td>(2130, APHA AWWA WEF, 2005)</td>
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<tr>
<td>Total hardness</td>
<td>French degrees</td>
<td></td>
</tr>
<tr>
<td>BOD\textsubscript{5}</td>
<td>mg/l</td>
<td>APHA-AWWA-WEF, 2005-5210b</td>
</tr>
<tr>
<td>COD</td>
<td>mg/l</td>
<td>APHA-AWWA-WEF, 2005-5220c</td>
</tr>
<tr>
<td>TOC</td>
<td>mg/l</td>
<td>(5310B, APHA AWWA WEF, 2005).</td>
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<tr>
<td>Dissolved Oxygen (DO)</td>
<td>mg/l</td>
<td>(APHA AWWA WEF, 2005).</td>
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<td>TSS (Total Suspended Solids)</td>
<td>mg/l</td>
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<tr>
<td>Solids</td>
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Source: APHA-AWWA-WEF, 2005-2540d

Source: APHA-AWWA-WEF, 2005-2540c

Source: APHA-AWWA-WEF, 2005-4500b
WATER MONITORING

<table>
<thead>
<tr>
<th>Metals</th>
<th>Pb</th>
<th>mg/l, μg/l</th>
<th>Cd</th>
<th>mg/l, μg/l</th>
<th>Fe</th>
<th>mg/l, μg/l</th>
<th>As</th>
<th>mg/l, μg/l</th>
</tr>
</thead>
</table>

APHA-AWWA-WEF, 2005-3111b,d

Samplings are carried out by qualified personnel under ISO 5667

Analyses are carried out in chemical laboratories accredited by National Accreditation Council (ESYD) according to ISO 17025: 2005

Results of the analyses are correlated with factors such as climatic data, motorway’s technical characteristics, traffic volumes, rainfall, topography, other polluting sources and geological data

All data are registered in data bases for statistical and geo-spatial analysis
WATER MONITORING
Water Pollution is caused by:

- pollutants collected on the road surface over time and washed off and transported during rainfall events
- accidental spillage of material (dangerous or not) on the motorway.
Prevention of Water Pollution

Pollution Control Units (PCUs): hydrocarbon separators that minimize the motorway’s impact on the water environment.
PREVENTION OF WATER POLLUTION

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PREVENTION OF WATER POLLUTION

Operation & Maintenance of Pollution Control Units (PCUs)
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WASTE COLLECTED

130508* (waste mixtures of chambers debris and oil/water separators)

160708* (waste containing oil)

130502* (sludges from oil/water)
The management stages of the hazardous waste collected from the PCUs of Egnatia motorway are the following:

- Collection of wastewater in tank trucks.
- Collection of mud residues in UN type barrels which are transferred by closed vehicles at the premises of the company responsible for their management.
- Transfer of liquid waste into storage tanks at the premises of the company responsible for temporary storage.
- Uploading of liquid waste from the tanks and transfer by tankers or trucks at the premises of the company responsible for their management.
PREVENTION OF WATER POLLUTION

Operation & Maintenance of Pollution Control Units (PCUs)
Waste Management

The final disposal and management of liquid waste is the following (under the disposal & recovery codes D9-D7-R3-R13):

a) Separating water from oil by physical flotation
b) Aggregation - Flocculation
c) Dissolved air flotation
d) Biological treatment

For the final disposal and management of sludge, bioremediation of contaminated soils and organic wastes is applied, through disposal D8.

Regarding waste oil from separators the overall waste treatment is carried out in four stages (under recovery code R9):

a) Receipt and storage
b) Dehydration
c) Rectifying
d) Refining
**Water Monitoring**

Analyses of the samples, have revealed that almost all values of measured parameters are within limits according to the Greek legislation relating to water intended for irrigation, and according to the law on water parameters features intended for human consumption.

Besides, the results of the analyses do not show strong differences between the sampling periods and also between upstream and downstream samplings in the same water body.
## Prevention of Water Pollution

<table>
<thead>
<tr>
<th>Type of Hazardous Waste</th>
<th>Quantity (Kg)</th>
<th>Code No (European Waste List)</th>
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</thead>
<tbody>
<tr>
<td>Sludge</td>
<td>2.120</td>
<td>130502</td>
</tr>
<tr>
<td>Waste Containing Oil</td>
<td>515.600</td>
<td>160708</td>
</tr>
<tr>
<td>Waste Mixtures of Chambers Debris &amp; Oil/Water Separators</td>
<td>13.000</td>
<td>130508</td>
</tr>
</tbody>
</table>
* Effects on water quality of water bodies from runoff water from motorways can be minimized by combining best management techniques, such as monitoring the water quality of both runoff and water bodies at the vicinity of the motorway and also by constructing and operating Pollution Control Units to lessen effects of motorway runoff on the water quality of receiving water bodies.

* The operation and maintenance of the PCUs is of highly importance, it is closely connected with water quality of adjacent receivers and it may present various types of hazards, requiring, at least, as a typical or particular workplace, performance of a risk assessment, definition of safe work practices, use of proper PPE and workers’ training.

* Contingency plans shall exist in case of accident and discharge of toxic loads in the motorway and certain specifications must be followed for the assessment and management of cumulative impacts on water bodies.
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THANK YOU FOR YOUR ATTENTION!

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