REACH impact on European Launchers programmes and associated activities: an overview of ESA strategy

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REACH definition

1. Increasing numbers of regulations in Europe are being implemented considering:
   - Sustainable development
   - Environmental impact
   - Human health

2. **REACH** means: **R**egistration , **E**valuation, **A**uthorisation of **CH**emicals is a European Union regulation 1907/06 adopted by the European Parliament and the Council of 18th December 2006.

- **Registration:** All chemical substances manufactured or imported in volume over 1ton/year should be registered according to REACH requirements to the ECHA European Chemicals Agency (ECHA)
- **Evaluation:** these substances are evaluated by a commission of ECHA on security, technical and quantity aspects as well as socio-economic aspects within the EC
- **Authorization** : substances that are defined as substance of very high concern (SVHC) may enter a procedure of authorization, with a sunset date of use. Annex XIV of the REACH regulation is a list of the SVHC to be progressively replaced by alternative technologies whether these are economically and technically viable.

Impact of REACH application

- Among these substances, Lead, Alodine (Chrome VI) and CMR products like hydrazine have been identified from the REACH regulations to be used on ESA programmes.

- These substances are used on launchers at various levels like metal/rubber, surface treatment and propulsion

- An assessment of the alternatives for these obsolescences with respect to REACH and the candidate list has to be performed and a proper survey to be made to ensure long terms solutions avoiding new obsolescences due to REACH regulations updates.

Case of Launchers

The case of hydrazine:

On launchers systems, the use of hydrazine is

a. On Ariane 5 (6 /year)
   - SCA stage on A5ES: around 100kg
b. On Vega: (3/year)
   - On SCA : around 40kg
c. On Soyuz (3/year)
   - On FREGAT SCA: 60 kg for VS01

The case of Chromates:

On launcher systems used mainly for surface treatment

Specificities of launchers

=>**The main objective of ESA to develop launchers is to guarantee to its Member States a European access to space .** This is fullfilled in particular by ensuring continuity of launchers production during the exploitation phase

=>Propellant supply is absolutely strategic for the life of the launchers programs

=>These substances in exploitation phase will be used for several decades during the whole life of the launcher

=>Exploring new alternative needs long term qualification process and create high cost impact on present programs

Impact of REACH on developed launchers programmes

- At the moment, no alternative qualified at launcher level exist at the moment on hydrazine as propellant , used by Vega, Soyuz and A5 configuration needed for ATV and GalileoThe impacts of REACH application on launchers under exploitation to modify any manufactured configuration is:

- Time for alternative development and qualification to space specifications. As an example, to develop and qualify a new propulsion system, it takes more than 10 years

- Need to requalification of supply chain but might also need additional systems loops to confirm launcher performance.

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- Development cost of new production line when needed

ESA Action Plan

a. Include in ESA contract clauses REACH regulations
b. Monitoring / mitigation of remaining risks
c. Establishing process for promotion and active support of industry REACH compliance through ESA/National Agencies coordination
d. Revision of all standards to update versus REACH regulations(ECSS)
e. Implementation of European and ESA internal REACH materials data bases
f. Continuous survey of REACH new candidates, closely followed in the Material and Process working group
g. Anticipate potential new candidates within the joint working groups with ESA , national space agencies, and European space industry by a common approach on obsolescence risk management , search for alternatives
h. Permanent communication between ESA and EC for authorisation lobbying

ESA strategy:
ongoing exploitation launchers

1.Review of the obsolescence strategy plan of our prime contractors (Airbus for Ariane), ELV for Vega and operator Arianespace for Soyuz and strategic stock when no alternative was available to ensure continuity in launchers production.

2.For the most critical items potentially impacting the launchers production disruption, the qualification of new source was treated in ARTA programme (Ariane Research and Technology programme) or passenger on ARTA engine sampling test.

3. Participate in the establishment of authorisation files when alternative is not available on the market through specific task forces:

- Case of hydrazine:
- Case of Chrome VI:

4.Launchers family obsolescence risk management : during development of Vega and A5ECA, a working group was leaded by ESA :VASCO (**V**ega **A**riane **S**ouz **CO**mmon equipemnent) aiming at survey commonalities on equipment and obsolescences treatment.

ESA strategy:
Future Launchers programmes

1. Introduce REACH regulation in the requirements of future programmes.
2. Obsolescence management: in the future, anticipation will be essential to prevent obsolescence of material or supplier and when alternative does not yet exist establish stock whenever possible to cover the life time of the production phase to cover transition to new supplier.
3. Continuous survey of REACH candidates list update
4. Enforce efforts within ESA and R&D programs to find alternatives following REACH regulations for future programmes.

ESA strategy:
Future launchers programmes (cont'd)

ESA future programmes:

a. Ariane 6 will use in the foreseen configurations A62/A64, solid and cryogenic propellants only , without hydrazine. For example, among different options, study on alternative solutions is ongoing in terms of peformance/cost while respecting REACH regulations for the new reaction control system for A6.

b. VEGA: The evolution of the small launcher VEGA configuration (VEGA-E), will analyse the possibility to replace the upper stage, AVUM using hydrazine by a European one with other propellant.

c. PRIDE , (evolution of IXV), is studying gaseous propellant for its propulsion

d. FLPP activities: studies on LOX –Methane propellant engine

Conclusions : REACH and ESA strategy forLaunchers programmes

1. REACH regulations will be increasing in the futture
2. ESA has already taken into account this concern in new space programmes by implementing REACH regulations as requirement in most of space programmes.
3. In On-going launchers programmes, closed loop processes are already used in production to avoid risk on using toxic propellant. Howdever, strategic stock is needed to prevent rupture in production
4. In the future, survey and anticipation will be essential to manage obsolescence risk. Strong risk management plan is essential will be essantial for the Prime contractor for the future Ariane 6 launcher. Intensive efforts has to be put in place for the future: research, risk analysis, to establish a solid and coherent launchers space programmes fulfilling the need of guaranteed access to space while respecting REACH regulations on flight subsystems but also on new ground systems and safety requirements
5. ***From any new development on launchers elements, REACH regulations is one element of the top level requirements.***