Regulatory trends in the battery industry

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Abstract

The scope of regulations in the battery industry is extensive and also complex. In the future, regulations will become more demanding and will encompass issues not currently considered. Increased focus on environmental issues by government bodies, environmental groups, local communities will result in more strict compliance standards. The USA is currently leading the world's battery industries in the scope and compliance level of regulations. By studying trends in the USA, the rest of the battery industry can prepare itself for the future operating environment. This paper reviews the most critical areas of air pollution, blood-lead levels and recycling. The paper concludes that the battery industry must adopt a culture of exceeding current compliance standards.

Introduction

There have been many changes in the battery industry in recent years. Significant product changes have occurred with the move from leaf to envelope separators, and from antimony to calcium alloys, as the challenges of modern vehicle electrics have been met. Furthermore, production technology is evolving rapidly with the advent of continuous plate-making and automated assembly lines.

But the greatest changes are yet to fully impact on the industry both in Australia and in Asia. These changes will require factory reorganization as well as significant capital expenditure, yet will not directly improve the product or gain manufacturing efficiencies. These changes will be those imposed by communities, environmental groups and governments as the world becomes more conscious of the health and environment hazards of the materials that are used in the construction of batteries.

GNB Battery Technologies

This paper relies on the experience of GNB Battery Technologies. The name GNB Battery Technologies is currently being introduced around the world. This new name is a reflection of the importance that technologies will have in the battery business.

GNB is the aggregation of a number of battery companies by the Australian-based company, Pacific Dunlop, namely:

- Dunlop Batteries (Australia)
- Chloride Batteries (Australia, USA and New Zealand)
- Amalgamated Batteries Ltd. (New Zealand)
- GNB Batteries (USA and Canada)

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TABLE 1

Operations of GNB Battery Technologies

	Automotive battery factories		Industrial battery factories		Recycling plants	
	1987	1993	1987	1993	1987	1993
Australia	3	1	1	1		
New Zealand	2	1			1	1
USA	11	7	5	5	3	3

TABLE 2

Comparison of key environmental standards

	USA	Australia and New Zealand
Lead in air (mg/m^3)	0.05	0.15
Blood lead ($\mu g/dl$)[a]	50	67

[a]Medical removal point.

These businesses were added to Dunlop Batteries in the period 1985 to 1987. Table 1 shows a comparison of the number of factories operated by GNB in 1987 compared with the present. Since 1987, GNB has moved to fewer, higher capacity, automotive battery factories. In 1987, the average production was less than one million batteries per annum per factory. Now, it is close to two million batteries per annum. This change to large, more capital intensive, plants is one way that GNB has reacted to increasing regulations – especially, environmental ones.

Table 2, also illustrates the extent of GNB's manufacturing involvement in the USA. This country is currently leading the world in battery industry regulations. A study of the trends in the USA provides a 'window to the future' for the regulations and levels of performance that the rest of the industry will be forced to achieve within the next decade. This paper will borrow heavily from GNB's experience in the USA in dealing with increasingly stringent regulations.

Battery industry regulations

It is the lead and environmental-based regulations that gain most attention, especially lead-in-air and blood-lead levels. Nevertheless, the scope of regulations that exists in the USA, and (to a lesser extent) Australia and New Zealand, is very much wider – and is increasing.

Currently, the areas of regulation include:

(i) environment

- atmospheric pollution
- factory lead-in-air
- stormwater contamination
- land contamination (both inside the factory and external to the factory)

- solid waste disposal
- liquid waste pollution
- acid pollution

(ii) occupational health and safety

- blood-lead levels
- foetal health
- cancer risks (e.g., acid mist inhalation)
- other safety and health working conditions, e.g., lifting weight limits and machine guarding

(iii) recycling

- smelter emissions and breaking/collection points for spent batteries are treated as for battery factories
- toxic gas emission (CO, NO_x, SO_x)
- mandatory recycling
- remediation action for batteries found in landfill

(iv) dangerous goods

- transport packaging (new and spent batteries)
- storage, handling (including warehouses)

(v) product liability

- battery explosion
- acid spill
- consumer damage (self-selection risks)

(vi) anti trust

- product warrantly
- consumer rights
- advertising claims

(vii) site liability

- 'polluter pays'
- eternal liability
- land remediation

Any one of these topics could command a seminar in its own right. This paper will simply give a brief summary of the major areas of air pollution, blood-lead levels and recycling. It should be noted that there are significant developments in the other areas as well.

Increasing rate of regulation change

The pace of change of regulation is accelerating. Figure 1 shows the changes in American regulation standards since 1980 and a projection for levels anticipated in five years time.

The pace of change in the USA is now so great that it is not sufficient simply to react to the current regulations, since by the time the required standard has been achieved the regulation will have become more stringent again. It is therefore necessary to estimate the standards that will be required in 5 to 10 years and to work towards achieving these targets.

At present, there is discussion in the USA that blood-lead levels should be reduced to 10 μg/100 g for the general community. Most people who have never been exposed to lead in their occupation, their blood-lead level ranges between 4 and 12 μg/100 g. Leaded petrol, food contamination and hobbies are the major contributing factors. If these levels are adopted, then the challenges that the industry faces are indeed daunting.

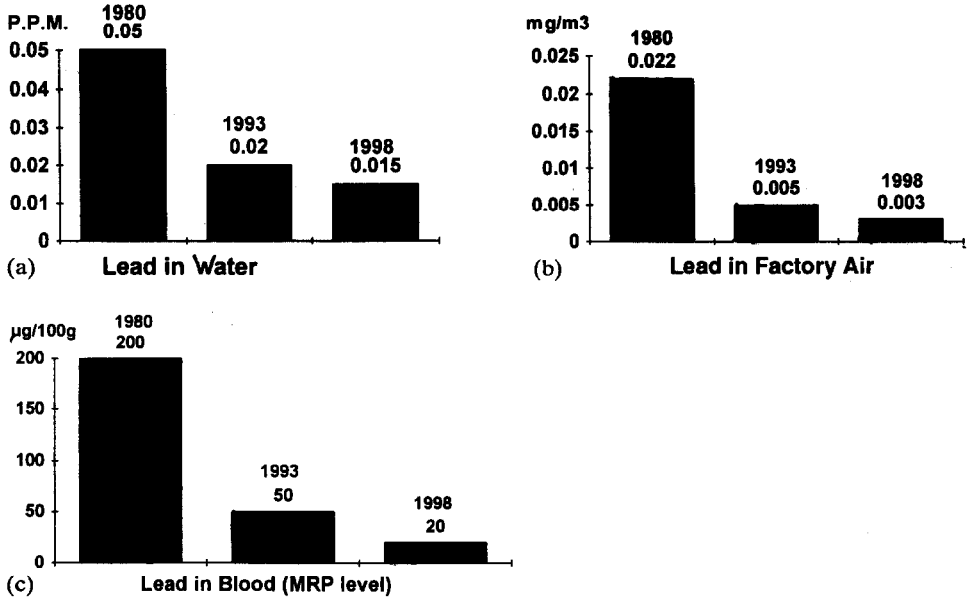

Fig. 1. Changes in US regulations. Lead in blood (medical removal point level).

The regulations in Australia and New Zealand are not yet as stringent as in the USA (see Table 2). It is clear, however, that not only are these countries going down the same route, but that Australia and New Zealand will actually catch up to the USA. This may well be within the next five years. In Australia and New Zealand, GNB now sets as its internal goals the next planned levels in the USA.

There is a clear lesson that Asian countries are also likely to follow very quickly the US standards now that it is demonstrated that battery manufacturers can achieve the levels.

GNB environmental approach

Responding to ever-changing regulations, GNB has adopted the following approach for all of its plants, regardless of location, around the world.

'GNB policy and practice aims at providing an environment which protects the health, safety and welfare of its employees, family members and the general community. Our objective is to push beyond compliance with existing regulations to assure provision of healthy and safe workplaces. This is achieved through leaders and employees developing and applying strategies and actions which are a key and integral part of our normal business activities. As a trans-national company, GNB will hold itself to consistent worldwide health standards. Where regulatory standards differ, GNB will establish consistent worldwide guidelines. Regulatory or legal conflicts will be resolved on a situation and country basis. However, where viable practices, processes and technology exist, we aim to set and achieve reasonable and responsible health and safety targets beyond regulatory compliance standards. This will ensure that we are protecting the health of our employees, family members and the general community in balance with the ability of GNB to do so'.

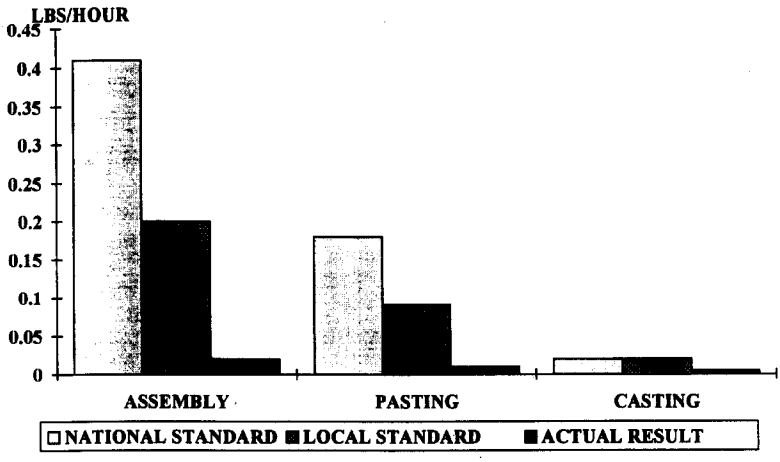

Fig. 2. Stack emission rates of lead.

GNB experience

In 1991, one of GNB's North American automotive battery factories was closed because of alleged air and land pollution. The allegations were made by a local community lobby group. These were not substantiated with test data from the site, but relied on circumstantial evidence.

The Local Clean Air authority ordered that the plant immediately cease operation and that GNB demonstrate that it was able to operate within the local regulations. At the same time, this authority revised its regulations to be 50% more stringent than the ruling National regulations for lead-in-air at the plant boundary.

First, GNB had to demonstrate that the allegations of the local community were false. Then, the plant had to set about achieving the new regulations. Lead-in-air monitors, located around the plant, are now operated. The data are recorded quarterly by the local authority, and daily by the plant personnel. In order to guard against erroneous readings, a duplicate GNB testing station has been installed next to each of the local authority's stations. Accordingly, the plant now operates with discharge levels that are less than half of that required by the authority (Fig. 2).

Capital needs and regulatory standards

Reduction of blood-lead levels is effected primarily through management discipline and factory culture. Lead-in-blood performance is not 'capital driven'. There is, however, a significant expense in the administrative processes and the provision of safety equipment (such as respirators). Furthermore, very tight plant-management discipline is required.

Reduction of blood-lead levels is achieved in the following ways:

(i) improved process control in lead-processing activities;

(ii) operator training and supervision, particularly in relation to personal hygiene;

(iii) modification of workstations to minimize operator exposure to lead-bearing materials, and

(iv) automation of manufacturing processes to remove operators altogether.

Lead-in-air is 'capital driven' to a greater extent. At a typical GNB battery plant in North America, it required approximately US$ 2.0 million capital to move lead-in-air levels from 0.15 to 0.05 mg/m^3. It was also necessary to focus on job and process design improvements. The latter may involve additional expense.

Recycling

The American recycling legislation is well known, but it is worth reviewing here. The start of regulatory complications was associated with the increase in environmental regulations that roughly coincided with the enactment of the 'Comprehensive Environmental Response, Compensation and Liability Act' (Superfund legislation) in 1980. Hazardous waste sites were identified and additional constraints were added to the storage battery industry.

In recent times, US Environmental Protection Agency (EPA) enforcement has been strengthened by the use of criminal investigators, including the FBI. It has been stated that: 'wire taps, informants, surveillance, eavesdropping and search warrants all now play significant roles in environmental enforcement'. Such investigations are followed by a search for potentially responsible parties who will reimburse the Superfund for the enormous clean-up costs.

Under the Superfund's Joint and Several Liability feature, the distributor may share in the responsibility because the other parties, in the 'chain of responsibility', are unable to meet the financial demands of the clean-up and/or fines. The share of liability may have little, or no, bearing on how much the distributor was actually negligent, even if there was no intentional wrong-doing.

The following real example from the USA illustrates the potential liabilities for everyone involved in the battery manufacture and distribution chains. In February 1992, the manager of a farm store in Iowa (USA) who had sent junk batteries to a salvage site (some seven years earlier) received an EPA form letter. He was 'requested' to reply within 30 days. (Compliance – a fully detailed, accurate and timely response – is mandatory, with applicable penalties of US$ 25 000 per day of non-compliance!). The 12-page letter included: (i) 16 detailed instructions; (ii) 23 complex legal definitions to explain the instructions, and (iii) 15 detailed questions, each to be answered in narrative form, with appropriate documentation. Some examples of the demands were as follows.

- the Federal income tax returns and financial statements of the farm store for the past five years
- full details of all liability insurance policies for the five-year period
- names, addresses and titles of anyone who may have visited the battery site
- dates, purpose and length of each visit
- number, type and condition of all batteries sent to this site and the money involved in each transaction

And there was more! Now, imagine the investment of your time and effort in responding to such a directive, not to speak of the possible legal liability at the end of it. No one can afford this risk by shipping junk batteries to processors that are not EPA-compliant.

The distributors or marketers (who are required by law to take in spent batteries) are also considered to be contributors to the problem of a non-complaint lead smelter if they forward even a single battery to such a site. The transporter of the battery between distributor and recycler may also be held liable. Consider, for instance, the

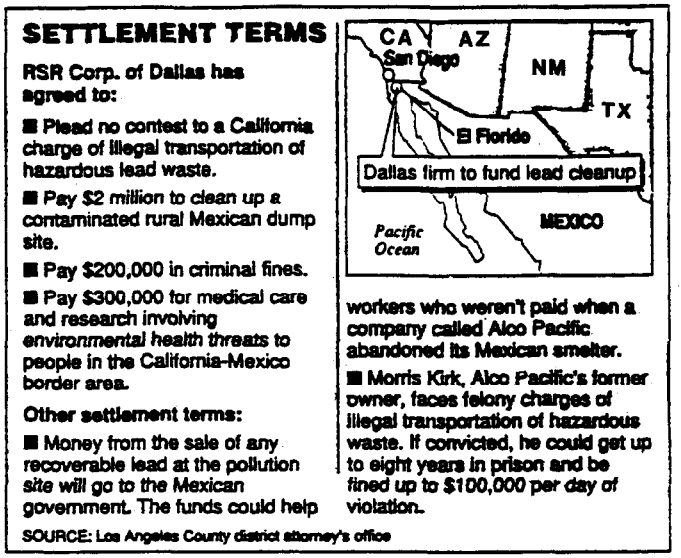

Fig. 3. Extract from Dallas Morning News, 16 June 1993.

Pennsylvania waste processing company that was recently convicted for violating that State's Solid Waste Management Act because a trucker hired to haul waste dumped part of his load when the truck bogged down in mud. The waste processor, who neither requested or participated in the dumping, was held criminally responsible merely for failure to adequately supervise the acts of another company. Legally, the manufacturer, distributor, transporter and recycler are all potentially responsible parties.

Future recycling issues

In July 1993, a landmark international cross-border case was created in Los Angeles when a Dallas (Texas, USA)-based company, RSR Corp., paid US$ 2.5 million to settle a spent battery pollution case that originated in El Florido, Mexico. RSR Corp. believed that it had operated 'absolutely legally' in shipping lead smelter waste to Mexico. The freight contractor (now bankrupt), however, dumped the RSR waste near another smelter site in Mexico that is now closed (Fig. 3).

This example demonstrates two principles. First, the industry at large has responsibility for the batteries that it creates – forever. Second, environmental issues are more and more becoming international.

GNB's experience in the USA, Australia and New Zealand is that as these types of recycling issues become more widely known, our customers will put pressure on us to demonstrate that we have recycling programmes in place that remove liability from the customer.

Conclusions

The scope of regulations in the battery industry is both extensive and complex. In the future, regulations will become more demanding and will encompass new issues.

Manufacturers should be prepared to accept that the compliance levels currently being set in the USA will become the benchmark for the rest of the world. In the future, industry contend both with increasingly stringent regulations, and with the involvement of community and environmental action groups, as well as government agencies.

Manufacturers should also be prepared to accept that it is possible for the battery industry to operate and to prosper notwithstanding the onerous regulatory environment. The industry must learn to manage its relationship with regulators, community groups and environmental action groups. It must be prepared for significant capital investment, significant management reorganization, and higher levels of management discipline.

Above all, the battery industry must adopt a culture of exceeding — rather than just ensuring — compliance standards. It is a common objective now to exceed customers expectations in terms of product quality. The industry's attitude should be similar for the wide range of the regulatory issues upon which performance is judged by employees, shareholders and local communities.