

Applicants/Intended Claimants: 1st:MC 1 to MC :29/06/07:29/-06/07

Judicial review-Application for leave to make a claim

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The Republic of Trinidad and Tobago

**In the High Court of Justice
Civil Court Office, San Fernando**

Claim No. CV2007-

BETWEEN

**THE TRINIDAD AND TOBAGO CIVIL RIGHTS ASSOCIATION
JANET ALEXANDER**

Applicant/ Intended Claimant

AND

THE ENVIRONMENTAL MANAGEMENT AUTHORITY

Intended Defendants

AFFIDAVIT OF DR. MARK L. CHERNAIK.

I, Dr. Mark L. Chernaik, of Eugene, Oregon, United States, environmental scientist, make oath and says as follows:

1. I am the deponent named herein. All the facts deposed herein are true and correct and are within my personal knowledge save and accept where otherwise stated in which case I verily believe the same to be true.

2. I am an Environmental Scientist attached to, Environmental Law Alliance Worldwide (ELAW) and I specialise in the field of the environmental impact of industrial facilities on people, flora and fauna and on the environment in general. In 1984 I attained a B.S in Biochemistry from the University of Massachusetts following which I earned a Juris Doctor (qualifying degree in Law in the US) from the University of Oregon Law School. I am a member of the Oregon State Bar but I am an inactive member. In 1990, I earned a doctorate in biochemistry from John S Hopkins University School of Hygiene and Public Health in Baltimore, Maryland, U.S.A.

3. I am currently a Staff Scientist for the U.S. Office of the Environmental Law Alliance Worldwide in Eugene, Oregon, U.S.A. I have held this position since June 1992. In this position I have assisted more than four hundred public interest lawyers in more than sixty countries, inter alia, in obtaining comprehensive and up-to-date scientific, technical, and medical information, publications, documents and analysis that are essential to the elements of a case; presenting scientific information in concise terms that judges and other decision-makers can most easily understand; critically evaluate the scientific and medical evidence presented by opposing parties; identifying and involving the best scientific and medical specialists; critically

evaluating Environmental Impact Assessments for proposed projects and designing, implementing and interpreting environmental testing projects.

4. For the past fourteen years, I have assisted people and organisations around the world make use of a wide range of scientific and technical information to solve environmental problems. In June 2005, the European Court of Human Rights relied extensively on my work to reach a landmark decision of ***Fadeyeva v. Russia*** (application no. 55723/00) regarding the rights of individuals exposed to toxic substances. My work by means of professional and expert opinions have also been followed by the Supreme Courts of India in the case ***M.C. Mehta v. Union of India*** (1999-(003)-CLJ 0361-SC) regarding the operation of hazardous waste generating industries within the Delhi Metropolitan area; The Supreme Court of Pakistan in ***Zia v. WAPDA*** (PLD 1994 (SC) 693) regarding the health effects of exposure to electromagnetic fields and the Supreme Court of Sri Lanka in ***Lalanath M. de Silva v Minister of Forestry and Environment*** regarding the necessity for establishing air pollutant emission standards. A true copy of my resume is now produced and shown to me marked "**M.C. 1**".

5. During my years as a practising Environmental Scientist I have authored a number of publications concerning the environment and environmental issues some of which are listed below:
 - Chernaik, M.L., & Huang, P.C., (1991) "Differential Effect of Cysteine-to-Serine Substitutions in Metallothionein on

Cadmium Resistance," Proc. Natl. Acad. Sci. 88:3024-3028

- Chernaik, M.L. (1998) "Empowering Environmental Lawyers Worldwide with Scientific Expertise," Journal of Environmental Law and Litigation 13:17-35
- Chernaik, M.L. (2003) "An Analysis of the Nuisance Odour and Health Problems in Chemor, Malaysia: Their Cause and Solutions," submitted to the High Court of Ipoh, Malaysia.
- Chernaik, M.L. (2004) "Human Health Risk Assessment of Pollutant Levels in the Vicinity of the 'Severstal' Facility in Cherepovets, Russia," submitted to the European Court of Human Rights.
- Chernaik, M.L. (2005) "Evaluation of The Environmental Impact Assessment Report Soapberry Wastewater Treatment Plant, St. Catherine, Jamaica," submitted to the National Environmental Protection Agency of Jamaica.
- Chernaik, M.L. (2005) "Evaluation of the Comprehensive Environmental Impact Assessment study for the Proposed Athirappilly Hydroelectric Project, India," submitted to the Kerala State Pollution Control Board.

6. My experience in assessing effects of aluminium smelter plants on the environment and on flora, fauna and human life is wide and varied. In my capacity as Staff Scientist for the U.S. Office of the Environmental Law Alliance Worldwide, I have advised on and assessed such effects in many countries such as Australia, Canada, Chile, India and Jamaica to name a few. My relevant experience in this field is as follows:

- In 1999, I provided an assessment of technologies for improving energy efficiency and hence reducing carbon dioxide (CO₂) emissions from Capral's aluminium smelter in Kurri Kurri for the Environmental Defenders Office in Australia;
- In 1998 and again in 2005 I provided an analysis of the environmental impacts and environmental performance standards for aluminium smelters (including energy efficiency standards) for the West Coast Environmental Law Centre in Canada;
- In 2001 and again in 2004, I provided a critical evaluation of the Environmental Impact Assessments for Noranda's proposed aluminium smelter in Aisen for FISCALIA de Medio Ambiente (FIMA) in Chile;
- In 2005, I provided a critical evaluation of the Environmental Impact Assessment of Vendanta's proposed aluminium smelter near Jharsuguda, Orissa for Agragamee in India;

- Between 2003 and 2004, I provided an assessment of sulphur dioxide emissions from JAMALCO's aluminium smelter (partially owned by Alcoa) in Clarendon for the Jamaican Environmental Trust;
 - In 2005 I provided a critical evaluation of the Environmental Impact Assessment for JAMALCO's proposed refuse disposal site for the Jamaican Environmental Trust;
 - In 2000, I provided a critical evaluation of the Environmental Impact Assessment for Comalco's proposed alumina plant in Bintulu for the Consumer's Association of Penang; and
 - In 2003 I provided a critical evaluation of the Terms of Reference for the Environmental Impact Assessment for Masco's proposed aluminium smelter in Lumut, Perak for the Consumer's Association of Penang.
7. I have been asked by the Applicants/Intended Claimants to provide my expert opinion on the decision of the Environmental Management Authority ("the EMA") to issue a Certificate of Environmental Clearance ("CEC") to the National Energy Corporation ("NEC") on the 2nd April, 2007 to carry on at Union Industrial Estate, Main Site 'B', La Brea, a designated activity under the EM Act namely being the "Establishment of an Aluminium Smelter Complex with a target capacity of 125,000

metric tonnes per annum" ("the decision"). I am duly authorised by the Applicants/Intended Claimants to swear to this affidavit on their behalf.

8. I have read the following documents which form part of the NEC's Application for a CEC for the establishment of an aluminium smelter complex at Union Estate, La Brea, Trinidad:

(a) The Application by NEC for the CEC dated 25th April 2005. A true copy of this application is now produced and shown to me marked "**M.C 2**". This application was numbered CEC1033/2005 by the EMA.

(b) The Final Terms of Reference for the Environmental Impact Assessment in respect of the said CEC ("the TOR"). A true copy of this TOR is now produced and shown to me marked "**M.C 3**".

(c) The "Environmental Impact Assessment for Proposed Aluminium Smelter Complex to be sited at Main Site North, Union Industrial Estate, La Brea prepared for Alutrint" ("the EIA") dated January 2006 together with the following reports which were submitted with the EIA as part of the assessment process:

(i) "Air Dispersion Model for an Aluminium Complex to be sited at Union Industrial Estate - Main Site North" dated January 2006

(ii) "Social Impact Assessment for the proposed Establishment for an Aluminium Complex at Main Site North, Union Industrial Estate, La Brea, Trinidad" dated January 2006

A true copy of this EIA together with the two reports mentioned at (c) (i) and (c) (ii) are together produced and bundled and shown to me marked **"M.C 4"**.

(d) "Supplementary Report – Alutrint Limited Response to the Environmental Management Authority's Review and Assessment Report" dated August 2006. A true copy of this Supplementary Report is now produced and shown to me marked **"M.C 5"**.

(e) "Human Health and Ecological Risk Assessment for the Proposed Alutrint Aluminium Complex" ("HHERA") dated February 2007. A true copy of this HHERA is now produced and shown to me marked **"M.C 6"**.

(f) The CEC issued on the 2nd April, 2007. A true copy of this CEC is now produced and shown to me marked **"M.C 7"**.

9. The aluminium smelter complex as proposed by the NEC would be based on the Hall-Heroult process (see pages 3-26 to 3-28 of the EIA **"M.C. 3"**). The basis for all modern primary aluminium smelting plants is the Hall-Hérault process, invented in 1886.

This process involves alumina being dissolved in an electrolytic bath of molten cryolite (sodium aluminium fluoride) within a large carbon or graphite lined steel container known as a "pot". An electric current is passed through the electrolyte at low voltage, but very high current, typically 150,000 amperes. The electric current flows between a carbon anode (positive), made of petroleum coke and pitch, and a cathode (negative), formed by the thick carbon or graphite lining of the pot. This process is known as electrolysis.

10. As a result of this process molten aluminium is deposited at the bottom of the pot and is siphoned off periodically, taken to a holding furnace, often but not always blended to an alloy specification, cleaned and then generally cast.
11. A typical aluminium smelter consists of around 300 pots. These will produce some 125,000 tonnes of aluminium annually. However, some of the latest generation of smelters are in the 350-400,000 tonne range.
12. From time to time individual pot linings reach the end of their useful life and the pots are taken out of service and relined.
13. Aluminium smelting plants produce a number of pollutants, which can cause serious negative effects on plant, animal and human life and on the environment. The main pollutants are spent aluminium pot liners (SPLs), Cyanide, Arsenic, Inorganic Fluoride, Perfluorocarbons (PFCs), Polyaromatic hydrocarbons (PAH) and Sulphur Dioxide

14. The main flaws which I have identified in respect of the decision of the EMA to grant to CEC dated the 2nd April, 2007 are as follows:

- There is no specific or clear provision for the disposal of Spent Pot Liner.
- The CEC has failed to take into consideration the effects of particulate matter pollution and/or emissions on human health, human life and the environment within the vicinity of the proposed aluminium smelter complex.
- The CEC dated 2nd April 2007 requires several analyses and information to be done which should have been part of the EIA

A. SPENT POT LINER ("SPL")

15. There is no definitive plan by NEC to deal with the disposal of SPL. In the EIA, the NEC has indicated temporary storage and subsequent shipping to a disposal institution in the USA as its preferred method of disposal of the SPL. My review of the Supplemental Report indicated that the off island disposal will be aggressively pursued. There is not at this time in any of the documentation reviewed any evidence of agreements or contracts with any hazardous waste facility. Any actual plan for disposal of the SPL to a treatment and disposal facility together with the relevant contracts, agreements and/or memoranda of understanding should have been included in the assessment by the EMA to grant the CEC.

16. The public records at the EMA show that by letter dated 21st March, 2007 (approximately two weeks before the CEC was issued), the EMA requested of the NEC for the NEC to provide adequate information and the status of negotiations with SPL treatment and disposal facilities in the USA. I have been informed by the Applicants/Intended Claimants instructing Attorney at Law that according to the public records at the EMA, that before the CEC was issued, there was no response to this letter. A true copy of this letter dated 21st March, 2007 is now produced and shown to me marked **"M.C 8"**.
17. NEC in its EIA and Supplementary Report (exhibited as **"M.C 4"** and **"M.C 5"** respectively) has indicated that shipping the SPL to a treatment facility in the USA is the primary choice (pages 3-34 of the EIA (**"M.C.4"**) and pages AIII - 4 and AIII - 5 of the Supplementary EIA Report (**"M.C.5"**)). There are alternatives in the event that the primary proposal does not bear fruit. Therefore at this time there is no indication as to which method of disposal will be used for the SPL. Further because of this there was no way for the EMA to properly evaluate the disposal method while assessing whether or not to grant the CEC.
18. An improper disposal of SPLs can lead to serious and imminent threats to human health, human life and the environment by the improper disposal of SPLs.
19. In the manufacture of aluminium in accordance with the smelting process referred to herein, from time to time individual

pot linings reach the end of their useful life and the pots are then taken out of service and relined. The lining of the pots will be removed to facilitate a new lining to be installed. Aluminium plants generate copious amounts of a hazardous waste known as spent aluminium pot liners (SPLs), which contains high levels of cyanide and other extremely hazardous substances such as polynuclear aromatics and fluorides.

20. According to the United States Environmental Protection Agency, constituents found in SPL include: "polynuclear aromatic hydrocarbons and metals, including arsenic, fluoride, and cyanide. Generally, concentrations of these constituents in spent potliners are as follows: <0.005mg/kg to 200 mg/kg polynuclear aromatics, <1.1 to <40 mg/kg arsenic, 18.25 mg/kg to 9,190 mg/kg total cyanide, 2.6 mg/kg to 4,800 mg/kg amenable cyanide, 230 mg/kg to 135,000 mg/kg fluoride, and various concentrations of other hazardous metals."
21. In the United States, SPLs are classified as hazardous waste by the U.S. Code of Federal Regulations, Title 40, Part 261, §261.32 - Hazardous wastes from specific sources (K088 - Spent Aluminum Potliners). An extract of the U.S. Code of Federal Regulations, Title 40, Part 261, §261.32 is attached and marked **M.C. 9**.
22. Improper disposal of spent aluminium pot liners (SPLs) poses a major environmental risk. Pollution caused by the improper disposal of SPLs liner may result in clean up costs amounting to several millions of US dollars. This has been evidenced by the

US Government establishing Several "Superfund" sites in the United States, that is, sites listed on the National Priorities List and requiring government-financed remedial actions due to pollution caused by the improper disposal of spent pot liner. It is likely that the same result will occur if the SPL is not properly disposed in Trinidad. The government of Trinidad and Tobago will have to spend several millions of US dollars to effect the clean up of pollution caused by improperly disposed SPL which is a likely result at La Brea, Trinidad because the SPL disposal plan was not properly evaluated by the EMA.

23. Cyanide and fluoride originating from the improper disposal of a pile of spent pot liners from an aluminium plant operated by Kaiser Aluminium near the town of Mead in Spokane County, Washington, U.S.A., contaminated an aquifer used as drinking water, resulting in the closure of drinking water wells. The total cost of cleaning up the contamination is estimated to be US\$100 million. Cyanide originating from spent pot liners from National Southwire Aluminium Company (NSA) near Hawesville in Hancock County, Kentucky, U.S.A., contaminated a shallow aquifer that flows to the Ohio River. Cyanide, was detected in one of the facility production wells which produced facility process water and drinking water for several hundred NSA workers. Wells within four miles of the facility draw water from the shallow aquifer and the River and serve over 16,000 people. The U.S. EPA estimates that the Total Present Cost of cleaning up the contamination is over US\$25 million. Like in Washington and Kentucky USA, cyanide and fluoride originating from the improper disposal of spent pot liners from the proposed

aluminium complex at Union Estate will contaminate surface and/or underground water in La Brea and surrounding areas. This will result in the pollution and contamination of drinking water sources in the area. Persons and animals consuming such polluted water will be at serious risk of contracting various ailments associated with the consumption of cyanide and fluorides.

24. Long-term exposure to low levels of hydrogen cyanide emitted from spent pot liners, adversely impacts the central nervous system (CNS) and the thyroid, an organ responsible for controlling the rate of human metabolism. Occupational epidemiological of hydrogen cyanide exposure are complicated by the mixed chemical environments, which are created by synthetic and metallurgic processes. However, reports which I have studied in the course of my profession as an expert in environmental science indicate that chronic low exposure to hydrogen cyanide can cause neurological, respiratory, cardiovascular, and thyroid effects (California Office of Environmental Health Hazard Assessment Chronic Toxicity Summary of Hydrogen Cyanide, last updated 2004). Frequently reported symptoms in the exposed workers included headache, weakness, and altered sense of taste or smell. Lacrimation, abdominal colic, and lower stomach pain, salivation, and nervous instability occurred less frequently. Increased blood haemoglobin and lymphocyte counts were present in the exposed workers. Twenty of the thirty-six exposed workers had thyroid enlargements, although there was no correlation between the duration of exposure with either the incidence or the degree of

enlargement. Thyroid function test indicated significant differences in uptake between controls and exposed individuals after 4 and 24 hours.

25. To prevent environmental contamination, the U.S. EPA prohibits the disposal on land of untreated spent aluminium pot liners, which it classifies as "K088 waste". According to the U.S. EPA: "Every year around 100,000 tons of K088 waste (spent aluminium pot liner from primary aluminium reduction) is generated by the aluminium industry. Under our existing Land Disposal Restrictions (LDR) program, generators are required to treat this waste to meet numerical concentrations standards prior to land disposal. Current treatment methods, while effective in achieving these numerical standards, have resulted in an almost three-fold increase in waste volume. Today's proposal signals a new direction for the LDR program, one which fosters the use of environmentally-sound recycling technologies over treatment that merely prepares a waste for land disposal. This proposal not only promotes the use of a technology that generates two usable products, fluoride dust and glass frit, it also results in the destruction of significant amounts of cyanide in K088 waste."

26. In its Environmental Impact Assessment for a Proposed Aluminium Smelter Complex to be sited at Main Site North, Union Industrial Estate, La Brea, Alutrint Ltd. stated: "Spent Pot Lining (SPL) is the primary hazardous waste generated by aluminium smelters. The SPL will be taken to a secure holding area on the plant site where it will await batch disposal at a

licensed off-island hazardous waste treatment and disposal centre in the USA. As a default option, Alutrint will also work with the Union Industrial Estate landlords to construct a secure purpose built landfill site, located within the boundary of the Union Industrial Estate for safe and secure temporary disposal of the SPL in the event that off-island disposal becomes problematic.” NEC has provided no details about the nature of landfill that would temporarily store SPL, nor provided criteria for determining whether off-island disposal of SPL would be ‘problematic.’

27. The NEC has not provided details about the environmental and health consequences should a cargo vessel carrying SPL suffer an accident and release toxic contaminants in Trinidad.
28. NEC has provided uncertain statements about how it would dispose of SPLs in Trinidad. The decision of the EMA to grant the CEC in these circumstances where there are no specific details as to where and how SPLs will be disposed is unreasonable and places at risk the human health, human life and the environment. These are factors which should have been taken into consideration in the EIA process. Where the assessment of the disposal of SPL is not adequately done it will increase the risk of improper disposal of SPL which will result in the contamination of the environment and the decreased levels of human health and human life of residents living close to the proposed aluminium smelter plant.

B. PARTICULATE AND GASEOUS MATTER POLLUTION AND EMISSIONS.

29. The Aluminium Smelter Complex is proposed to be established at the Union Industrial Estate La Brea is approximately ½ mile from the Vessigny Government School and approximately 1 mile from Vessigny Village. Based on the natural north east trade winds that occur in Trinidad any particulate emissions will be blown directly towards Vessigny Government School and Vessigny Village.

30. The proposed Aluminium Smelter Complex will by processes produce and emit a number of dangerous and hazardous particulate and gaseous emissions such as Fluoride Emissions, Polyaromatic Hydrocarbons and Sulphur Dioxide, which will adversely affect human life, human health and the environment.

31. The NEC's aluminium smelter complex would emit air pollutants in close proximity to residential communities. Persons who live within a ten mile radius of the proposed aluminium smelter complex at La Brea would be affected by the particulate and gaseous emissions of the smelter. Approximately 10,000 people live within a ten-mile radius of the proposed smelter.

(i) Fluoride Emissions

32. Fluoride emissions are inherent to aluminium smelters. Airborne gaseous and solid fluorides are emitted from the pots during electrolysis. The main pollutant (50 to 80%) is gaseous

hydrogen fluoride (HF), whilst the rest is solid fluorides (mainly aluminium fluoride and cryolite). HF is formed by reaction of aluminium fluoride and cryolite with hydrogen, introduced to the pot as fixed water in aluminium oxide, as residual hydrogen in anodes and as moisture in the air.

33. Fluoride emissions from aluminium smelters have caused extensive damage to the flora and fauna surrounding such facilities around the world. The scientific literature is replete with studies documenting the damage fluoride emissions from aluminium smelters have caused to surrounding vegetation and livestock.
34. NEC's proposed aluminium smelter complex would be located in close proximity to susceptible natural resources. For example, the proposed Alutrint Ltd. aluminium smelter would be located in close proximity to the Morne L'Enfer Forest Reserve and the emissions from the proposed aluminium smelter complex will have an adverse effect on the plants and animals of the Morne L'Enfer Forest Reserve.
35. Fluoride is a potent human toxicant. Small amounts of fluoride help prevent tooth cavities, but high levels can harm human health. Drinking or eating excessive fluoride during the time teeth are being formed (before 8 years of age) can cause visible changes in teeth. This condition is called dental fluorosis. At very high concentrations of fluoride, the teeth can become more fragile and sometimes can break. In adults, exposure to high levels of fluoride can result in denser bones. However, if

exposure is high enough, these bones may be more fragile and brittle and there may be a greater risk of breaking the bone. In animals, exposure to extremely high doses of fluoride can result in decreased fertility and sperm and testes damage.

36. The World Health Organisation (WHO) states: "fluoride levels in ambient air should be less than 1 µg/m³ to prevent effects on livestock and plants. These concentrations will also sufficiently protect human health", WHO (2000) "Air Quality Guidelines – Second Edition". Accordingly, the WHO has established a long term (annual average) guideline of 1 µg/m³ of fluoride in ambient air.

(b) Polycyclic Aromatic Hydrocarbons (PAH)

37. Aluminium smelters are also notorious for their emissions of polycyclic aromatic hydrocarbons, which arise from the production of carbon anodes. According to the Integrated Pollution Prevention and Control Bureau of the European Commission (2001): Paste for anodes other electrodes and most special carbon products are produced from petroleum coke and coal tar pitch. Emissions of hydrocarbons as tars can occur during delivery, transfer, mixing and baking. Coal tar pitch also contains PAHs, which will also be emitted. PAHs are potentially hazardous in the environment as well as inside industrial plants and this is an important issue within the carbon industry. According to an investigation made in 1989, the total (uncontrolled) emission of PAHs by anode baking is 0.432 kg per tonne anode. In modern plants, emissions from mixing and baking are therefore cleaned

e.g. in condensing systems followed by dry scrubbing systems using alumina in a plant associated with a primary aluminium smelter or coke/lime, where the hydrocarbons and PAHs are returned to the production process.

38. Emissions of PAH have the potential to cause cancer. Several of the PAHs, including benz[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[j]fluoranthene, benzo[k]fluoranthene, chrysene, dibenz[a,h]anthracene, and indeno[1,2,3-c,d]pyrene, have caused tumors in laboratory animals when they breathed these substances in the air, when they ate them, or when they had long periods of skin contact with them. Studies of people show that individuals exposed by breathing or skin contact for long periods to mixtures that contain PAHs and other compounds can also develop cancer.

(c) Sulphur Dioxide (SO₂)

39. Petroleum coke used for the production of carbon electrodes that form the aluminium reduction cells will contain approximately 3% sulphur, all of which is converted to sulphur dioxide and emitted into the atmosphere from anode bake ovens and when anode is consumed during electrolysis.
40. Sulphur dioxide is a criteria air pollutant. Sulphur dioxide (SO₂) causes a wide variety of health and environmental impacts because of the way it reacts with other substances in the air. Particularly sensitive groups include people with asthma who are active outdoors or indoors, children, the elderly, and people with

heart or lung disease. Peak levels of SO₂ in the air can cause temporary breathing difficulty for people with asthma. Longer-term exposures to high levels of SO₂ gas and particles cause respiratory illness and aggravate existing heart disease. SO₂ reacts with other chemicals in the air to form tiny sulphate particles. When these are breathed, they gather in the lungs and are associated with increased respiratory symptoms and disease, difficulty in breathing, and premature death. Further SO₂ can result in acid rain. SO₂ and nitrogen oxides react with other substances in the air to form acids, which fall to earth as rain, fog, snow, or dry particles. Some may be carried by the wind for hundreds of miles. Acid rain is devastating to the environment as Acid rain damages forests and crops, changes the makeup of soil, and makes lakes and streams acidic and unsuitable for fish. Continued exposure over a long time changes the natural variety of plants and animals in an ecosystem. SO₂ accelerates the decay of building materials and paints, including irreplaceable monuments, statues, and sculptures that are part of our nation's cultural heritage.

41. According to the following studies, aluminium smelter workers are at increased risk of bladder and pancreatic cancer. Carta P. et. Al. (2004) "Mortality for Pancreatic Cancer Among Aluminium Smelter Workers, in Sardinia, Italy," *G Ital Med Lav Erg* 26(2):82-89; Romundstad, P. et.al. (2000) "Cancer Incidence and cause specific mortality among workers in two Norwegian aluminium reduction plants," *American Journal of Industrial Medicine*, 37(2):175-183; Ronneberg, A. et. Al. (1999) "Occupational exposure and cancer incidence among workes

from an aluminium smelter in western Norway.” Scand J Work Environ Health, 25(3):207-14.

(d) Risks Associated with Emissions

42. Aluminium smelter plants have the potential to seriously damage the environment, affect the health of workers and inhabitants of surrounding communities. Furthermore, significant damage can be done to the flora and fauna of the surrounding environment and to marine life if rigid pollution control practices are not enforced.
43. By emitting fluoride, the NEC proposed aluminium smelter complex would subject residential communities to a risk of suffering excess incidences of dental and skeletal fluorosis, causing brittle and cracking teeth and bones.
44. By emitting polyaromatic hydrocarbons, the NEC proposed aluminium smelter complex would subject these residential communities to a risk of suffering excess incidences of cancer.
45. By emitting SO₂, the NEC proposed aluminium smelter complex would subject these residential communities to a risk of suffering increased incidences of asthmatic attacks, respiratory symptoms, such as wheezing in the chest, chest tightness, shortness of breath, coughing, awakening by attack of breathing difficulty, a feeling of pain, pressure or tightness in the chest, and even premature death.

46. Therefore, it is my considered and informed opinion that the establishment of the NEC proposed aluminium smelter complex is fraught with environmental risks that could have a devastating impact on human, animal and plant life and seriously and adversely affect the environment around the vicinity of each plant.

C. Conditions imposed in the CEC

47. I have noticed that the CEC calls for several analyses and information to be done which should have been included as part of the Environmental Impact Assessment procedure. These include:

- Buffer Zone Management and Monitoring Plan
- Sediment and Storm Water Management Plan
- Particulate Monitoring Plan
- Road Traffic Management Plan
- Environmental Management Systems
- Source Emissions Testing Plan
- Ambient Air Quality Monitoring Plan
- Soil Monitoring Plan
- Ground Water Monitoring Plan
- Spent Pot Lining (SPL) Management Plan
- Emergency Prevention and Response Plan
- Decommissioning / Abandonment Plan

48. The EIA process is essentially a planning tool that enables stakeholders' participation in decisions affecting the environment. By placing all of these plans and analyses and

information outside of the EIA process (that is after the issuance of the CEC) frustrated the fundamental purpose of the EIA process i.e. allowing stakeholders to scrutinize the essential elements of the proposal and express their opinion on the worthiness of the project.

49. In my opinion these plans should have been submitted to the EMA prior to the grant of a CEC. This kind of information is fundamental to a determination and assessment of the application for a CEC. The EMA should have been satisfied as regards the quality and adequacy of these plans prior to granting a CEC permitting the construction of the aluminium smelter complex.
50. I have read the pre-action letter of the Applicants/Intended Claimants dated the 30th April, 2007 and I agree with the contents of said letter.
51. The Attorneys at Law for the Applicants/Intended Claimants obtained my advice before they wrote a Pre Action protocol Letter dated 30th April 2007 to the EMA in respect of its decision to issue the said CEC. I have read the Applicants/ Intended Claimants' Pre Action Protocol Letter and I endorse its contents.
52. I have seen and read the EMA's response to the Claimants' Pre Action Protocol Letter dated 8th June 2007 in which the EMA contends that it discharged faithfully its legal and constitutional obligations in respect of the issuance of the CEC. The EMA contends inter alia that:

- (a) **Violation of Constitutional Rights-** the Air Dispersion Modelling Report and the HHERA (see exhibit "M.C 5") submitted to the EMA by the NEC addressed whether they were significant human health and ecological risks and the EMA contended that the health and ecological impact was within acceptable standards.
- (b) **CEC Conditions-** The conditions and/or plans referred to in the CEC are not part of the assessment process and that the plans are subject to approval by the authority prior to the commencement of work.
- (c) **Spent Pot Liners-** That the proposed plan for storage, disposal and treatment of the SPLs was discussed in the Supplementary EIA Report and that in summary SPLs are to be placed in specially designed IMO 25 metric tonne steel bins, sealed and warehoused, they will be shipped from Brighton to Alcoa thermal destruction facility in Arkansas, United States in accordance with UN recommendations on the transport of dangerous goods.
- (d) **Inadequate evaluation-** The EMA is satisfied that it gave full and careful consideration to all relevant and material matters and complied with its obligations under the EM Act.

53. In respect of the EMA's response to the pre-action protocol letter, I am of the opinion that the response of the EMA is not a proper answer to the concerns expressed in the Pre Action

Protocol letter. I say in respect of the response of the EMA the following:

a) In respect of the response of the EMA concerning the Violation of Constitutional Rights:-

(i) I do not agree that the said reports submitted to the EMA by the NEC adequately assessed the health and ecological impact of the proposed aluminium smelter complex to be within acceptable standards.

(ii) The HHERA does not as alleged by the EMA assess adequately the impact to human health of the predicted increase of fine particulate matter made up of particles of 1/100 of a millimetre in diameter (referred to as "PM-10"), and includes sulphate aerosols derived from SO₂ emissions, and a substantial portion of fluoride emissions and polyaromatic hydrocarbons emissions that would result from the proposed activity.

(iii) Instead of assessing the impact to human health of predicted increases in PM-10, the HHERA at page 5-5 assumes that when the levels are below the US Environmental Protection Agency's and World Health Organisation's standards there are no health impacts. It states

"As seen from the above table, the predicted incremental PM-10 and PM-2.5 concentrations

are below the health-based criteria; therefore no health effects related to particulate matter are expected from stack emissions from the proposed aluminium smelter complex.”

- (iv) Based on the scientific data studies of which I have personal knowledge and experience of large populations they show a strong effect of PM-2.5 and PM-10 on mortality within that population and scientist have been unable to identify a ‘no effect’ threshold that is a particulate size which had no ill effects on human health and/or human life.
- (v) The predicted increases in the quantity of PM-10 in the vicinity of the proposed aluminium smelter plant would not be trivial. The HHERA indicates in Table 5.2-2 on page 5-8 that the 24 hour maximum PM-10 levels in Union Village will more than double.
- (vi) The omission of considering the effects of the particulate matter in the HHERA is more serious since it failed to account for the extent to which acid gases such as hydrogen fluoride and sulphur dioxide would convert to particulates or attach to aerosol droplets, substantially increasing particulate matter levels in Union Village and other locations. At Table 3.2-1 on page 3-7 the HHERA showed a predicted increase in annual sulphur dioxide and hydrogen fluoride. A substantial portion of these ‘gases’ will

attach to microscopic droplets of water becoming part of the overall PM-10 burden within the atmosphere.

- (vii) The NEC in producing its air dispersion model does not account for the transformation of these acids gasses to particulates therefore it has seriously underestimated the levels of particulate matter that would result from the proposed aluminium smelter complex. Further the HHERA at page 5-6 indicated that maximum annual concentration in the study area occurs at the Vessigny High School location.

- (viii) According to page AX-9 of the Supplemental EIA dated August 18th, 2006, submitted to the EMA on behalf of the NEC with respect to the Alutrint Smelter, NEC predicts that it would emit more than 16.7 kg of SO₂ per each metric ton (MT) of aluminium it produces. Multiplying the annual output of aluminium (i.e. 125,000 tons per annum) by the 16.7kg of SO₂ per each metric ton (MT) of aluminium produced the proposed Alutrint Smelter would emit more than 2,080,000 kg (2080 metric tons) of SO₂ per year.

- (ix) In the Certificate of Environmental Clearance Rules at Rule 10(i) mandates that in the process of the EIA it gives the citizens a right to know what substances will be emitted and what the likely effects of such

emissions are. Persons who are likely to be affected are entitled therefore to know from the EIA process the likely effects of the increased levels of particulate matter burden.

- (x) CEC Rules Rule 10(i) requires that “an identification of the potential hazards and an assessment of the level of risk that may be caused by the proposed activity....; Under the EM Act and the CEC Rules, people living in Union Village have the right to know how this predicted increase in PM-10 levels would increase the incidence of disease even if ‘overall predicted levels of PM-10 would not exceed U.S. EPA or WHO standards’.

b) In respect of the response of the EMA concerning the CEC Conditions:-

- i. I have reviewed the Chapters and Sections of the EIA the Supplementary Report and have concluded that these kinds of studies and plans are required to be resolved in the EIA process and not after the grant of permission for the project. It is therefore my opinion that these plans should have been submitted to the EMA prior to the grant of the CEC. This kind of information is fundamental to the determination and assessment of an application for a CEC. The EMA

should have been satisfied as regards to the quality and adequacy of these plans prior to granting a CEC.

c) In respect of the response of the EMA concerning Spent Pot Liners:-

- i. I have discussed the adverse effects and risks which are with Spent Pot liners in paragraphs 14 to 27 above and I hereby repeat the same.
- ii. there is no definitive plan by NEC/Alutrint to deal with the disposal of SPL. In the EIA, the NEC has indicated temporary storage and subsequent shipping to a disposal institution in the USA as its preferred method of disposal of the SPL. My review of the EIA and Supplemental Report indicates that there is there is no definitive plan by NEC/Alutrint to deal with the disposal of SPL. Any actual plan for disposal of the SPL to a treatment and disposal facility together with the relevant contracts, agreements and/or memoranda of understanding should have been included in the assessment by the EMA to grant the CEC.
- iii. The EMA therefore has not considered and/or evaluated the storage and/or disposal process of these poisonous and hazardous substances. Moreover, members of the public have not been given their statutory right to get information and to comment on

these matters and further to have their comments on these matters considered by the EMA before it decided to grant a CEC.

d) In respect of the response of the EMA concerning Inadequate Evaluation

- i. In its response the EMA has indicated that the evaluation process was a two year process in which it made several requests for information from the applicant and in which it received numerous reports and responses. There is no doubt that the evaluation was a lengthy one however it is not possible to adequately evaluate a project such as the establishment of an aluminium smelter complex without the necessary relevant information to inform such a decision to grant a CEC. In my opinion the EMA did not have the necessary relevant matter and information to inform its decision.

- ii. I have in this affidavit a number of instances of inadequacies of the EMA such as the improper evaluation of particulate matter to be emitted by the proposed plant, lack adequate provision and proper evaluation with respect of the disposal of SPL and the lack of proper evaluation by the EMA of necessary plans and analyses before the grant of the CEC.

54. Therefore it is my considered opinion that the establishment of the proposed aluminium smelter complex is fraught with environmental risks that would have a devastating impact on human health, human life, animal life, plant life and will seriously and adversely affect the environment around the said aluminium smelter complex.

SWORN to at)
in the City of)
in the United States of America)
this day of , 2007)

Before me,

Notary Public

Applicants/Intended Claimants: 1st:MC 1 to MC 9 :29/06/07:29/-06/07

Judicial review-Application for leave to make a claim

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AND

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Intended Defendants

"M.C.1"

This is the exhibit marked "M.C. 1" in the Affidavit of Mark Chernaik sworn to on the
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"M.C.2"

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"M.C.3"

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"M.C.4"

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"M.C.5"

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"M.C.6"

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"M.C.7"

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"M.C.8"

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"M.C.9"

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"M.C.10"

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