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VOTEFLUX.ORG | Upgrade Democracy!

13th February 2022

To:
Joanne Reid
Assistant Commissioner
Disclosure, Assurance and Engagement
Australian Electoral Commision

Re: Notice under s 137(1)(b) of the Commonwealth Electoral Act 1918 (Electoral Act) – Intention to Deregister – VOTEFLUX.ORG | Upgrade Democracy!

Dear Ms Reid,

In your January 13 correspondence, you said:
> I am notifying you under s 137(1)(b) of the Electoral Act that the Electoral Commission is considering deregistering the Party, as the Electoral Commission is satisfied on reasonable grounds that the Party does not have at least 1,500 members.

I speak on behalf of the Party. We do not believe that such a decision would be based on reasonable grounds. This is because the AEC's methodology is flawed. Below, we will detail why we believe that this is the case and provide reasoning and evidence to back this up.

We have 3 arguments supporting our case. Each argument is *individually* sufficient to show that a decision (by the AEC) to deregister the Party would not be based on reasonable grounds; each argument is a *decisive criticism* of the current methodology.

- The statistical method used fails ~10% of the time for borderline cases.
- The statistical method uses an artificially limited sample size and thus does not estimate party membership, though does (roughly) measure membership attrition.
- We have sufficient membership and provide evidence. **Attached is a list of 4680 members. Each entry was, at some point, verified against the electoral roll.**

Unless *each* of these criticisms can be addressed, we do not believe that a decision by the AEC to deregister the Party would be based in reality.

The AEC's membership test methodology fails 10% of the time in borderline cases

Our understanding of the AEC's method is to sample the membership provided and use this as a basis for *statistical analysis* that provides an answer to whether the Party meets membership requirements. That is: given a list of N members ($1500 \leq N \leq 1650$) and n trials, estimate the ratio of N which are valid members. Although this is (presumably) done without replacement, given that $n \ll N$, we can estimate the distribution as binomial (this is good enough for a "sniff test").

Assume that a party submits a list of 1650 members, and exactly 1500 of these claimed members still consider themselves to be members. That is, the true probability of a random member confirming their membership is P(success) = 1500/1650 = 0.909; i.e., P(failure) = 0.0909. Let us consider the binomial distribution with $p = 0.0909$ (the failure rate). Given $n = 53$, $x = 7$ (x is the maximum number of failures) what is the probability that $P(x < X)$? (That is: how likely is it that 7 less than the number of observed failures, X?)

In this case, $P(7 < X) = 10.5\%$.
Note: this can be verified quickly in excel with the formula:

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=1 - BINOM.DIST.RANGE(53, 0.0909, 0, 7)
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So, if exactly 1500 of 1650 were valid, the AEC would make an *incorrect* determination (i.e., one that is in **conflict with reality**) 10.5% of the time.

In your previous correspondence you said:
> [...] the Electoral Commission is satisfied on reasonable grounds [...]

Does the AEC believe that a false negative rate of 10.5% is acceptable and constitutes "reasonable grounds"? We do not.

The AEC's membership test methodology artificially reduces sample size

Let us consider whether there are more than 1500 cars, owned by residents, in Sydney. Assume that Sydney has a residential population of 5,000,000 and the probability of a resident owning a car is 91% (the expected failure rate is 0.09). All residents own 0 or 1 cars.

Using the AEC's membership testing methodology as a template, we can estimate the number of cars in Sydney via this method: first, select 1650 residents. Conduct 53 trials. If there are more than 7 failures, then there are less than 1500 cars owned by residents in Sydney. In this hypothetical case, there were 9 failures.

I trust that you can plainly see that this methodology is flawed. It is flawed because it is artificially reducing the sample size without accounting for the full population. The same error is being made by the AEC when evaluating party validity on the basis of membership testing.

What sort of error correction could we do here to *actually* estimate the number of cars in Sydney? Here is one rudimentary method: by inspection we can see that a binomial distribution with approximately twice the failure rate (0.17) has mean of 9 – i.e., if the failure rate were 0.17 then we would expect 9 of 53 trials to fail (with a std. dev. of 2.74). If the true failure rate was 0.17 (i.e., 83% of residents own a car), then we can guess that there are $0.83 \cdot (5 \cdot 10^6) = 4.15 \cdot 10^6$ cars; a bit over 4 million.

Keep in mind that – given this experimental setup – we'd expect 9 or more failures 10% of the time. If we were doing this experiment in real life, 10% of the time we would underestimate the number of cars by a factor of more than 2500x. (Of course, this large

because the population of Sydney is large – the exact factor isn't important; the fact that we underestimated by an unquantifiable degree is, though, and indicates flawed methodology.)

We trust that the connection to the current matter is obvious. Artificially reducing the sample size, and then treating this sample size as the population size, will lead to significant errors.

Returning to specifics of the matter at hand: if we correct for the AEC's artificial reduction in sample size using the rudimentary method above, based on the Party's claimed membership count (4,680), then it would be expected that the Party has a verifiable membership count of 3,884 members. This exceeds the requirements in s 137(1)(b) of the Electoral Act. Even if this were an overestimation by a factor of 2x, the Party would still meet the requirements of the Act.

Thus, we reject any decision to deregister the party – based on the procedures that the AEC has undertaken to date – on the grounds that it is in **conflict with reality**.

Bonus: a decisively superior methodology at no additional cost

We note that the AEC could, at very little cost (time, energy, expense, etc), dramatically increase the confidence of their membership testing by accepting lists of more than 1650 members and following this procedure:
1. Automatically match all possible members against the electoral roll (as is already done). The cost of automatically matching names against the electoral roll is constant regardless of the input size (because it is done by computer). If less than 1650 names are automatically matched, proceed to manual verification (as is done currently) and stop at 1650. Note that this *will only ever save the AEC time and money*. It is economically rational to do this.
2. Where more than 1650 members can be automatically matched, record this number.
3. Select 1650 names from that list and conduct 53 trials. use the failure rate to estimate the probability of a member being valid.
4. Use this probability, combined with the length of the list in step (2) to estimate the valid membership population of the party being tested.
5. Calculate error measurements and confidence intervals, etc. (Or evaluate against predetermined thresholds.)
6. Determine eligibility.

This method is *profitable* for the AEC – i.e., the AEC would save money using this procedure over the current procedure. Additionally, parties that are *true negatives* will still be *true negatives* at no additional cost. Incidence of *false negatives*, however, will be greatly reduced.

Finally, we have sufficient membership and attach proof

Please find attached a list of 4,680 members of the Party. *Note that these are the subset of members for whom we have been able to pre-validate their electoral roll details at some point.*

Based on the observation that 4,680 is a lot more than 1,500, we reject any decision to deregister the Party on the grounds that it is in **conflict with reality**.

Closing remarks

There are other issues at play that the AEC is ignoring in continuing to use broken methodology. The following example is not part of our rejection of a decision to deregister, but is another criticism of the AEC's methodology.

Consider a soon-to-be-registered party with 1650 valid members (assume this is true). What happens if 200 malicious members join (prior to registration), with the sole purpose of preventing that party from registering? Then, it's expected that ~10.8% of the membership list provided to the AEC as part of their registration application are these malicious members. Thus the failure rate according to the AEC's methodology is *expected to exceed the current threshold* (set by the AEC) – the AEC would conclude that the party does not meet requirements. However, **we know that the party in question is eligible because it is an assumption of this paragraph!**

This is another demonstration of the AEC's method producing results that conflict with reality. Although *this example is not relevant to the current matter between the Party and the AEC*, it is an important demonstration of the insufficient nature of the current methodology. Furthermore, preventing these sort of griefing attacks should be a concern of the AEC, and the Commission should seek to rectify such methodological issues – as is its responsibility.

We submit to you that we have presented 4 *independent and decisive criticisms* of the AEC's methodology (3 of which are grounds for our rejection of a decision to deregister). Furthermore, we have shown how the AEC can improve the accuracy of their method *and save money doing it* (in the worst case, the cost is the same).

For the sake of clarity: a *decisive criticism* is a reason that an idea will not work. If someone plans to take a holiday on Mars, some decisive criticisms are that they have no way to get there, not enough money to buy transport with appropriate life support, the technology for such life support has not yet been developed, etc. If that person wanted to holiday on Mars, they would need to solve *each* of those criticisms (solving one is not enough).

Similarly, solving one of the 3 key criticisms we have presented above is not enough. All 3 must be solved for us to consider accepting a decision to involuntarily deregister the Party. The AEC's current methodology is insufficient to support a decision to deregister, as such a decision would **contradict the evidence**.

We trust that the Commission has understood the nature and severity of the criticisms we have raised, and will proceed with due consideration.

Nathan Spataro
Registered Officer