



TechRate
AUDIT COMPANY

Neuron

Smart Contract Security Audit

Disclaimer

This is a limited report on our findings based on our analysis, in accordance with good industry practice as at the date of this report, in relation to cybersecurity vulnerabilities and issues in the framework and algorithms based on smart contracts, the details of which are set out in this report. In order to get a full view of our analysis, it is crucial for you to read the full report. While we have done our best in conducting our analysis and producing this report, it is important to note that you should not rely on this report and cannot claim against us on the basis of what it says or doesn't say, or how we produced it, and it is important for you to conduct your own independent investigations before making any decisions. We go into more detail on this in the below disclaimer below – please make sure to read it in full.

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The analysis of the security is purely based on the smart contracts alone. No applications or operations were reviewed for security. No product code has been reviewed.

Background

TechRate was commissioned by Neuron to perform an audit of smart contracts:

<https://github.com/avele/Neuron-Contracts/tree/master/contracts>

Commit: 5a03ae717abd500211c2318d5cf74e66100a5da8

- Controller.sol
- Gauge.sol
- GaugesDistributor.sol
- MasterChef.sol
- NeuronPool.sol
- NeuronToken.sol

The purpose of the audit was to achieve the following:

- Ensure that the smart contract functions as intended.
- Identify potential security issues with the smart contract.

The information in this report should be used to understand the risk exposure of the smart contract, and as a guide to improve the security posture of the smart contract by remediating the issues that were identified.

Issues Checking Status

| Issue description | | Checking status |
|-------------------|---|-----------------|
| 1. | Compiler errors. | Passed |
| 2. | Race conditions and Reentrancy. Cross-function race conditions. | Passed |
| 3. | Possible delays in data delivery. | Passed |
| 4. | Oracle calls. | Passed |
| 5. | Front running. | Passed |
| 6. | Timestamp dependence. | Passed |
| 7. | Integer Overflow and Underflow. | Passed |
| 8. | DoS with Revert. | Passed |
| 9. | DoS with block gas limit. | Low issues |
| 10. | Methods execution permissions. | Passed |
| 11. | Economy model of the contract. | Passed |
| 12. | The impact of the exchange rate on the logic. | Passed |
| 13. | Private user data leaks. | Passed |
| 14. | Malicious Event log. | Passed |
| 15. | Scoping and Declarations. | Passed |
| 16. | Uninitialized storage pointers. | Passed |
| 17. | Arithmetic accuracy. | Passed |
| 18. | Design Logic. | Passed |
| 19. | Cross-function race conditions. | Passed |
| 20. | Safe Open Zeppelin contracts implementation and usage. | Passed |
| 21. | Fallback function security. | Passed |

Security Issues

✓ High Severity Issues

No high severity issues found.

✓ Medium Severity Issues

No medium severity issues found.

✓ Low Severity Issues

1. Out of gas

Issue:

- The function `distribute()` in `GuageDistribution` contract uses the loop to calculate reward. Function will be aborted with `OUT_OF_GAS` exception if there will be a long tokens list.

Recommendation:

Check that the tokens array length is not too big.

Owner privileges (In the period when the owner is not renounced)

Controller.sol

Governance address can:

- change devfund, treasury, onesplit, governance and strategist addresses.
- change split variable value that used for treasury percentage calculation.
- change pool address for certain token address in nPool map.
- approve or revoke converter.
- revoke strategy.
- set strategy for token.
- withdraw tokens.

Timelock address can:

- change timelock address.
- approve strategy.
- change convenience fee that used for calculation distribution for dev and treasury addresses.
- Owner can lock and unlock. By the way, using these functions the owner could leave as owner even after the ownership was renounced.

GaugesDistributor.sol

- Governance can change minter, admin and treasury addresses.
- Governance can add new Gauge token.
- Governance and Admin can distribution function.
- Admin can change admin address.
- change split variable value that used for treasury percentage calculation.

MasterChef.sol

- Governance can change neuron token per block rate.
- Governance can change bonus end block value.
- Governance can change dev fund percentage.

NeuronPool.sol

- Governance can min variable value that used as numerator in calculation of available token amount.
- Governance can change governance address.
- Timelock can change timelock and controller addresses.
- Controller can call harvest function.

Conclusion

Smart contracts contain low severity issue!

TechRate note:

Please check the disclaimer above and note, the audit makes no statements or warranties on business model, investment attractiveness or code sustainability. The report is provided for the only contract mentioned in the report and does not include any other potential contracts deployed by Owner.