



# Armors Labs

## Seaweed

### Smart Contract Audit

- Seaweed Audit Summary
- Seaweed Audit
  - Document information
    - Audit results
    - Audited target file
  - Vulnerability analysis
    - Vulnerability distribution
    - Summary of audit results
    - Contract file
    - Analysis of audit results
      - Re-Entrancy
      - Arithmetic Over/Under Flows
      - Unexpected Blockchain Currency
      - Delegatecall
      - Default Visibilities
      - Entropy Illusion
      - External Contract Referencing
      - Unsolved TODO comments
      - Short Address/Parameter Attack
      - Unchecked CALL Return Values
      - Race Conditions / Front Running
      - Denial Of Service (DOS)
      - Block Timestamp Manipulation
      - Constructors with Care
      - Unintialised Storage Pointers
      - Floating Points and Numerical Precision
      - tx.origin Authentication

# Seaweed Audit Summary

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Project name : Seaweed Contract

Project address: None

Code URL : None

Commit : None

Project target : Seaweed Contract Audit

Blockchain : Huobi ECO Chain (Heco)

Test result : PASSED

Audit Info

Audit NO : 0X202104060018

Audit Team : Armors Labs

Audit Proofreading: <https://armors.io/#project-cases>

## Seaweed Audit

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The Seaweed team asked us to review and audit their Seaweed contract. We looked at the code and now publish our results.

Here is our assessment and recommendations, in order of importance.

## Document information

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Name	Auditor	Version	Date
Seaweed Audit	Rock ,Hosea, Rushairer	1.0.0	2021-04-06

## Audit results

Note that as of the date of publishing, the above review reflects the current understanding of known security patterns as they relate to the Seaweed contract. The above should not be construed as investment advice.

Based on the widely recognized security status of the current underlying blockchain and smart contract, this audit report is valid for 18 months from the date of output.

(Statement: Armors Labs reports only on facts that have occurred or existed before this report is issued and assumes corresponding responsibilities. Armors Labs is not able to determine the security of its smart contracts and is not responsible for any subsequent or existing facts after this report is issued. The security audit analysis and other content of this report are only based on the documents and information provided by the information provider to Armors Labs at the time of issuance of this report ("information provided" for short). Armors Labs postulates that the information provided is not missing, tampered, deleted or hidden. If the information provided is missing, tampered,

deleted, hidden or reflected in a way that is not consistent with the actual situation, Armors Labs shall not be responsible for the losses and adverse effects caused.)

## Audited target file

file	md5
ERC20PresetMinterPauser.sol	7feb2b7cf1463e73477bd84460d25c9f
SeaweedHBTCOptions.sol	e52aaafaf3b8065abd0fea32bf9e53c3
SeaweedStakingHBTC.sol	c29eec1940a4d0f9e0c58ad94a86a4f9
StakingRewards.sol	44a67ae724992762c211ea5aaf7a072f
ElasticPriceOffering.sol	c193eeec418b03774bb454205f8ff521
SeaweedHETHOptions.sol	ae03f9d12a7129133739dd2949101cf4
SeaweedStakingHETH.sol	02e6e1b8d2142a3bcf776acacb1d8bd2
SeaweedHTOptions.sol	37b8c47adfb4f905fa36d556f98d64f7
SeaweedStakingHT.sol	6d64c26ed34e75d2f43525439db5aeaa
RSWFtoSWF.sol	e9d5933da7c4aeef165c6f4cc2c1cc65
SeaweedHTPool.sol	02178fe50859445b3e5382d9c5738692
SeaweedToken.sol	a2e1f6977c3bce2f78130b114f3f65f3

## Vulnerability analysis

### Vulnerability distribution

vulnerability level	number
Critical severity	0
High severity	0
Medium severity	0
Low severity	0

### Summary of audit results

Vulnerability	status
Re-Entrancy	safe
Arithmetic Over/Under Flows	safe
Unexpected Blockchain Currency	safe
Delegatecall	safe
Default Visibilities	safe

Vulnerability	status
Entropy Illusion	safe
External Contract Referencing	safe
Short Address/Parameter Attack	safe
Unchecked CALL Return Values	safe
Race Conditions / Front Running	safe
Denial Of Service (DOS)	safe
Block Timestamp Manipulation	safe
Constructors with Care	safe
Unintialised Storage Pointers	safe
Floating Points and Numerical Precision	safe
tx.origin Authentication	safe

## Contract file

```

.
├── ERC20PresetMinterPauser.sol
├── ElasticPriceOffering.sol
├── LinearBondingCurve.sol
├── RSWFtoSWF.sol
├── SeaweedHBTCOptions.sol
├── SeaweedHETHOptions.sol
├── SeaweedHTOptions.sol
├── SeaweedHTPool.sol
├── SeaweedStakingHBTC.sol
├── SeaweedStakingHETH.sol
├── SeaweedStakingHT.sol
├── SeaweedToken.sol
└── StakingRewards.sol

```

## Analysis of audit results

### Re-Entrancy

- **Description:**

One of the features of smart contracts is the ability to call and utilise code of other external contracts. Contracts also typically handle Blockchain Currency, and as such often send Blockchain Currency to various external user addresses. The operation of calling external contracts, or sending Blockchain Currency to an address, requires the contract to submit an external call. These external calls can be hijacked by attackers whereby they force the contract to execute further code (i.e. through a fallback function) , including calls back into itself. Thus the code execution "re-enters" the contract. Attacks of this kind were used in the infamous DAO hack.

- **Detection results:**

PASSED!

- **Security suggestion:**

no.

## Arithmetic Over/Under Flows

- **Description:**

The Virtual Machine (EVM) specifies fixed-size data types for integers. This means that an integer variable, only has a certain range of numbers it can represent. A uint8 for example, can only store numbers in the range [0,255]. Trying to store 256 into a uint8 will result in 0. If care is not taken, variables in Solidity can be exploited if user input is unchecked and calculations are performed which result in numbers that lie outside the range of the data type that stores them.

- **Detection results:**

PASSED!

- **Security suggestion:**

no.

## Unexpected Blockchain Currency

- **Description:**

Typically when Blockchain Currency is sent to a contract, it must execute either the fallback function, or another function described in the contract. There are two exceptions to this, where Blockchain Currency can exist in a contract without having executed any code. Contracts which rely on code execution for every Blockchain Currency sent to the contract can be vulnerable to attacks where Blockchain Currency is forcibly sent to a contract.

- **Detection results:**

PASSED!

- **Security suggestion:** no.

## Delegatecall

- **Description:**

The CALL and DELEGATECALL opcodes are useful in allowing developers to modularise their code. Standard external message calls to contracts are handled by the CALL opcode whereby code is run in the context of the external contract/function. The DELEGATECALL opcode is identical to the standard message call, except that the code executed at the targeted address is run in the context of the calling contract along with the fact that msg.sender and msg.value remain unchanged. This feature enables the implementation of libraries whereby developers can create reusable code for future contracts.

- **Detection results:**

PASSED!

- **Security suggestion:** no.

## Default Visibilities

- **Description:**

Functions in Solidity have visibility specifiers which dictate how functions are allowed to be called. The visibility determines whether a function can be called externally by users, by other derived contracts, only internally or only externally. There are four visibility specifiers, which are described in detail in the Solidity Docs. Functions default to public allowing users to call them externally. Incorrect use of visibility specifiers can lead to some devastating vulnerabilities in smart contracts as will be discussed in this section.

- **Detection results:**

PASSED!

- **Security suggestion:**

no.

## Entropy Illusion

- **Description:**

All transactions on the blockchain are deterministic state transition operations. Meaning that every transaction modifies the global state of the ecosystem and it does so in a calculable way with no uncertainty. This ultimately means that inside the blockchain ecosystem there is no source of entropy or randomness. There is no `rand()` function in Solidity. Achieving decentralised entropy (randomness) is a well established problem and many ideas have been proposed to address this (see for example, RandDAO or using a chain of Hashes as described by Vitalik in this post).

- **Detection results:**

PASSED!

- **Security suggestion:**

no.

## External Contract Referencing

- **Description:**

One of the benefits of the global computer is the ability to re-use code and interact with contracts already deployed on the network. As a result, a large number of contracts reference external contracts and in general operation use external message calls to interact with these contracts. These external message calls can mask malicious actors intentions in some non-obvious ways, which we will discuss.

- **Detection results:**

PASSED!

- **Security suggestion:**

no.

## Unsolved TODO comments

- **Description:**

Check for Unsolved TODO comments

- **Detection results:**

PASSED!



- **Security suggestion:**

no.

## Short Address/Parameter Attack

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- **Description:**

This attack is not specifically performed on Solidity contracts themselves but on third party applications that may interact with them. I add this attack for completeness and to be aware of how parameters can be manipulated in contracts.

- **Detection results:**

PASSED!

- **Security suggestion:**

no.

## Unchecked CALL Return Values

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- **Description:**

There are a number of ways of performing external calls in solidity. Sending Blockchain Currency to external accounts is commonly performed via the `transfer()` method. However, the `send()` function can also be used and, for more versatile external calls, the CALL opcode can be directly employed in solidity. The `call()` and `send()` functions return a boolean indicating if the call succeeded or failed. Thus these functions have a simple caveat, in that the transaction that executes these functions will not revert if the external call (initialised by `call()` or `send()`) fails, rather the `call()` or `send()` will simply return false. A common pitfall arises when the return value is not checked, rather the developer expects a revert to occur.

- **Detection results:**

PASSED!

- **Security suggestion:**

no.

## Race Conditions / Front Running

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- **Description:**

The combination of external calls to other contracts and the multi-user nature of the underlying blockchain gives rise to a variety of potential Solidity pitfalls whereby users race code execution to obtain unexpected states. Re-Entrancy is one example of such a race condition. In this section we will talk more generally about different kinds of race conditions that can occur on the blockchain. There is a variety of good posts on this subject, a few are: Wiki - Safety, DASP - Front-Running and the Consensus - Smart Contract Best Practices.

- **Detection results:**

PASSED!

- **Security suggestion:**

no.

## Denial Of Service (DOS)

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- **Description:**

This category is very broad, but fundamentally consists of attacks where users can leave the contract inoperable for a small period of time, or in some cases, permanently. This can trap Blockchain Currency in these contracts forever, as was the case with the Second Parity MultiSig hack

- **Detection results:**

PASSED!

- **Security suggestion:**

no.

## Block Timestamp Manipulation

- **Description:**

Block timestamps have historically been used for a variety of applications, such as entropy for random numbers (see the Entropy Illusion section for further details), locking funds for periods of time and various state-changing conditional statements that are time-dependent. Miner's have the ability to adjust timestamps slightly which can prove to be quite dangerous if block timestamps are used incorrectly in smart contracts.

- **Detection results:**

PASSED!

- **Security suggestion:**

no.

## Constructors with Care

- **Description:**

Constructors are special functions which often perform critical, privileged tasks when initialising contracts. Before solidity v0.4.22 constructors were defined as functions that had the same name as the contract that contained them. Thus, when a contract name gets changed in development, if the constructor name isn't changed, it becomes a normal, callable function. As you can imagine, this can (and has) lead to some interesting contract hacks.

- **Detection results:**

PASSED!

- **Security suggestion:**

no.

## Unintialised Storage Pointers

- **Description:**

The EVM stores data either as storage or as memory. Understanding exactly how this is done and the default types for local variables of functions is highly recommended when developing contracts. This is because it is possible to produce vulnerable contracts by inappropriately initialising variables.

- **Detection results:**

PASSED!

- **Security suggestion:**

no.

## Floating Points and Numerical Precision

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- **Description:**

As of this writing (Solidity v0.4.24), fixed point or floating point numbers are not supported. This means that floating point representations must be made with the integer types in Solidity. This can lead to errors/vulnerabilities if not implemented correctly.

- **Detection results:**

PASSED!

- **Security suggestion:**

no.

## tx.origin Authentication

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- **Description:**

Solidity has a global variable, tx.origin which traverses the entire call stack and returns the address of the account that originally sent the call (or transaction). Using this variable for authentication in smart contracts leaves the contract vulnerable to a phishing-like attack.

- **Detection results:**

PASSED!

- **Security suggestion:**

no.

The background is a dark teal color with a complex, layered geometric pattern. In the center, there is a 3D cube with a blue base and a teal top. Above the cube is a transparent teal rectangular prism. To the left and right of the cube are two large, stylized teal shields. The entire scene is overlaid with a grid of binary code (0s and 1s) in a lighter teal color.

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