# Cyberscope

## Audit Report

# Pepega

May 2023

# Table of Contents

# Review

| Contract Name | Pepega |
|---|---|
| Testing Deploy | https://testnet.bscscan.com/address/0x60b62fdaa8aa862c2b98 26c8d356a1371b0595a0 |
| Symbol | $PEPEGA |
| Decimals | 18 |
| Total Supply | 1,000,000,000 |

# Audit Updates

| Initial Audit | 14 May 2023 |
|---|---|

# Source Files

| Filename | SHA256 |
|---|---|
| contracts/testingDeploy/PEPEGA.sol | fe4d28232102e3e9120bad69e7c59d4a5e 99cda26f3d3d7d829b478e601d0b72 |

# Findings Breakdown
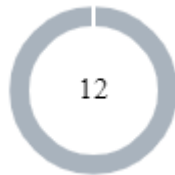
|  | Critical | 0 |
|---|---|---|
|  | Medium | 0 |
|  | Minor / Informative | 12 |

| Severity | Unresolved | Acknowledged | Resolved | Other |
|---|---|---|---|---|
| Critical | 0 | 0 | 0 | 0 |
| Medium | 0 | 0 | 0 | 0 |
| Minor / Informative | 12 | 0 | 0 | 0 |

# Analysis

● Critical    ● Medium    ● Minor / Informative    ● Pass

| Severity | Code | Description | Status |
|:---:|---|---|---|
| ● | ST | Stops Transactions | Unresolved |
| ● | OCTD | Transfers Contract's Tokens | Passed |
| ● | OTUT | Transfers User's Tokens | Passed |
| ● | ELFM | Exceeds Fees Limit | Passed |
| ● | ULTW | Transfers Liquidity to Team Wallet | Passed |
| ● | MT | Mints Tokens | Passed |
| ● | BT | Burns Tokens | Passed |
| ● | BC | Blacklists Addresses | Passed |

## ST - Stops Transactions

| Criticality | Minor / Informative |
| --- | --- |
| Location | contracts/testingDeploy/PEPEGA.sol#L930 |
| Status | Unresolved |

## Description

The contract's transactions are disabled by default. Once the contract owner enables them, it will not be possible to be disabled again.

```
if (!tradingActive) {
    require(
        _isExcludedFromFees[from] || _isExcludedFromFees[to],
        "Trading is not active."
    );
}
```

## Recommendation

The team should carefully manage the private keys of the owner's account. We strongly recommend a powerful security mechanism that will prevent a single user from accessing the contract admin functions. Some suggestions are:

- Introduce a multi-sign wallet so that many addresses will confirm the action.
- Introduce a governance model where users will vote about the actions.

# Diagnostics

● Critical    ● Medium    ● Minor / Informative

| Severity | Code | Description | Status |
|----------|------|-------------|--------|
| ● | FAI | Fees Amount Inconsistency | Unresolved |
| ● | PTRP | Potential Transfer Revert Propagation | Unresolved |
| ● | PVC | Price Volatility Concern | Unresolved |
| ● | RSML | Redundant SafeMath Library | Unresolved |
| ● | L04 | Conformance to Solidity Naming Conventions | Unresolved |
| ● | L07 | Missing Events Arithmetic | Unresolved |
| ● | L09 | Dead Code Elimination | Unresolved |
| ● | L15 | Local Scope Variable Shadowing | Unresolved |
| ● | L16 | Validate Variable Setters | Unresolved |
| ● | L19 | Stable Compiler Version | Unresolved |
| ● | L20 | Succeeded Transfer Check | Unresolved |

# FAI - Fees Amount Inconsistency

| | |
|---|---|
| **Criticality** | Minor / Informative |
| **Location** | contracts/testingDeploy/PEPEGA.sol#L1066 |
| **Status** | Unresolved |

## Description

The state variable `tokensForMarketing` accumulate the transaction fees. During the `swap()` flow the accumulated fees are swapped for ETH and the `tokensForMarketing` is reset. If the contract owner executes the `withdrawToken()` method the accumulated fees will be transferred to the owner's address but the `tokensForMarketing` will not be updated.

## Recommendation

The team is advised to reset the `tokensForMarketing` variable when the `withdrawToken()` is called.

# PTRP - Potential Transfer Revert Propagation

| Criticality | Minor / Informative |
| --- | --- |
| Location | contracts/testingDeploy/PEPEGA.sol#L1065 |
| Status | Unresolved |

## Description

The contract sends funds to a `marketingWallet` as part of the transfer flow. This
address can either be a wallet address or a contract. If the address belongs to a contract
then it may revert from incoming payment. As a result, the error will propagate to the
token's contract and revert the transfer.

```
payable(marketingWallet).transfer(bnbForMarketing);
```

## Recommendation

The contract should tolerate the potential revert from the underlying contracts when the
interaction is part of the main transfer flow. This could be achived by not allowing set
contract addresses or by sending the funds in a non-revertable way.

# PVC - Price Volatility Concern

| | |
|---|---|
| **Criticality** | Minor / Informative |
| **Location** | contracts/testingDeploy/PEPEGA.sol#L817 |
| **Status** | Unresolved |

## Description

The contract accumulates tokens from the taxes to swap them for ETH. The variable `updateSwapTokensAtAmount` sets a threshold where the contract will trigger the swap functionality. If the variable is set to a big number, then the contract will swap a huge amount of tokens for ETH.

It is important to note that the price of the token representing it, can be highly volatile. This means that the value of a price volatility swap involving Ether could fluctuate significantly at the triggered point, potentially leading to significant price volatility for the parties involved.

```solidity
function updateSwapTokensAtAmount(
    uint256 newAmount
) external onlyOwner returns (bool) {
    swapTokensAtAmount = newAmount * (10 ** 18);
    return true;
}
```

## Recommendation

The contract could ensure that it will not sell more than a reasonable amount of tokens in a single transaction. A suggested implementation could check that the maximum amount should be less than a fixed percentage of the total supply. Hence, the contract will guarantee that it cannot accumulate a huge amount of tokens in order to sell them.

# RSML - Redundant SafeMath Library

| Criticality | Minor / Informative |
|---|---|
| Location | contracts/testingDeploy/PEPEGA.sol |
| Status | Unresolved |

## Description

SafeMath is a popular Solidity library that provides a set of functions for performing common arithmetic operations in a way that is resistant to integer overflows and underflows.

Starting with Solidity versions that are greater than or equal to 0.8.0, the arithmetic operations revert on underflow and overflow. As a result, the native functionality of the Solidity operations replaces the SafeMath library. Hence, the usage of the SafeMath library adds complexity, overhead and increases the gas consumption unnecessarily.

```
library SafeMath {...}
```

## Recommendation

The team is advised to remove the SafeMath library. Since the version of the contract is greater than `0.8.0` then the pure Solidity arithmetic operations produce the same result.

If the previous functionality is required, then the contract could exploit the `unchecked { ... }` statement.

Read more about the breaking change on https://docs.soliditylang.org/en/v0.8.16/080-breaking-changes.html#solidity-v0-8-0-breaking-changes.

## L04 - Conformance to Solidity Naming Conventions

| | |
|---|---|
| **Criticality** | Minor / Informative |
| **Location** | contracts/testingDeploy/PEPEGA.sol#L576,578,609,651,705,732,746,860,865,1087,1093 |
| **Status** | Unresolved |

## Description

The Solidity style guide is a set of guidelines for writing clean and consistent Solidity code. Adhering to a style guide can help improve the readability and maintainability of the Solidity code, making it easier for others to understand and work with.

The followings are a few key points from the Solidity style guide:

1. Use camelCase for function and variable names, with the first letter in lowercase (e.g., myVariable, updateCounter).
2. Use PascalCase for contract, struct, and enum names, with the first letter in uppercase (e.g., MyContract, UserStruct, ErrorEnum).
3. Use uppercase for constant variables and enums (e.g., MAX_VALUE, ERROR_CODE).
4. Use indentation to improve readability and structure.
5. Use spaces between operators and after commas.
6. Use comments to explain the purpose and behavior of the code.
7. Keep lines short (around 120 characters) to improve readability.

```
address indexed sender,
        uint256 amount0,


uint256 amount1,
...
external view returns (uint256);

    function kLast() exte

ountTokenMin,
        uint256 amountETHMin,



...
```

## Recommendation

By following the Solidity naming convention guidelines, the codebase increased the readability, maintainability, and makes it easier to work with.

Find more information on the Solidity documentation

https://docs.soliditylang.org/en/v0.8.17/style-guide.html#naming-convention.

## L07 - Missing Events Arithmetic

| Criticality | Minor / Informative |
|---|---|
| Location | contracts/testingDeploy/PEPEGA.sol#L820,833,845,861,866 |
| Status | Unresolved |

## Description

Events are a way to record and log information about changes or actions that occur within a contract. They are often used to notify external parties or clients about events that have occurred within the contract, such as the transfer of tokens or the completion of a task.

It's important to carefully design and implement the events in a contract, and to ensure that all required events are included. It's also a good idea to test the contract to ensure that all events are being properly triggered and logged.

```
18);
    }

    function updateMaxWallet

ludeFromMaxTransaction(

...

        buyMarketingFee = _mar

romFees(account, excluded);
    }

    "The pair cannot be removed from a
```

## Recommendation

By including all required events in the contract and thoroughly testing the contract's functionality, the contract ensures that it performs as intended and does not have any missing events that could cause issues with its arithmetic.

## L09 - Dead Code Elimination

| Criticality | Minor / Informative |
| --- | --- |
| Location | contracts/testingDeploy/PEPEGA.sol#L334,798,1036 |
| Status | Unresolved |

## Description

In Solidity, dead code is code that is written in the contract, but is never executed or reached during normal contract execution. Dead code can occur for a variety of reasons, such as:

- Conditional statements that are always false.
- Functions that are never called.
- Unreachable code (e.g., code that follows a return statement).

Dead code can make a contract more difficult to understand and maintain, and can also increase the size of the contract and the cost of deploying and interacting with it.

```
r(account, address(0), amount);

        _afterTokenTransfer(account, address(0), amount);
    }

    function _approve(
...
        emit Approval(owner, spender, amount);
    }

    function _beforeTokenTransfer(
        address from,
        address to,
        uint256 amou

...
```

## Recommendation

To avoid creating dead code, it's important to carefully consider the logic and flow of the contract and to remove any code that is not needed or that is never executed. This can help improve the clarity and efficiency of the contract.

## L15 - Local Scope Variable Shadowing

| Criticality | Minor / Informative |
|---|---|
| Location | contracts/testingDeploy/PEPEGA.sol#L764 |
| Status | Unresolved |

## Description

Local scope variable shadowing occurs when a local variable with the same name as a variable in an outer scope is declared within a function or code block. When this happens, the local variable "shadows" the outer variable, meaning that it takes precedence over the outer variable within the scope in which it is declared.

```
 e);
        excludeFromFees(address(0xdea
```

## Recommendation

It's important to be aware of shadowing when working with local variables, as it can lead to confusion and unintended consequences if not used correctly. It's generally a good idea to choose unique names for local variables to avoid shadowing outer variables and causing confusion.

## L16 - Validate Variable Setters

| | |
|---|---|
| **Criticality** | Minor / Informative |
| **Location** | contracts/testingDeploy/PEPEGA.sol#L901 |
| **Status** | Unresolved |

## Description

The contract performs operations on variables that have been configured on user-supplied input. These variables are missing of proper check for the case where a value is zero. This can lead to problems when the contract is executed, as certain actions may not be properly handled when the value is zero.

```
RC20: transfer to the zero address")
```

## Recommendation

By adding the proper check, the contract will not allow the variables to be configured with zero value. This will ensure that the contract can handle all possible input values and avoid unexpected behavior or errors. Hence, it can help to prevent the contract from being exploited or operating unexpectedly.

# L19 - Stable Compiler Version

| | |
|---|---|
| **Criticality** | Minor / Informative |
| **Location** | contracts/testingDeploy/PEPEGA.sol#L16 |
| **Status** | Unresolved |

## Description

The `^` symbol indicates that any version of Solidity that is compatible with the specified version (i.e., any version that is a higher minor or patch version) can be used to compile the contract. The version lock is a mechanism that allows the author to specify a minimum version of the Solidity compiler that must be used to compile the contract code. This is useful because it ensures that the contract will be compiled using a version of the compiler that is known to be compatible with the code.

```
/**
    * @dev Initia
```

## Recommendation

The team is advised to lock the pragma to ensure the stability of the codebase. The locked pragma version ensures that the contract will not be deployed with an unexpected version. An unexpected version may produce vulnerabilities and undiscovered bugs. The compiler should be configured to the lowest version that provides all the required functionality for the codebase. As a result, the project will be compiled in a well-tested LTS (Long Term Support) environment.

# L20 - Succeeded Transfer Check

| Criticality | Minor / Informative |
| --- | --- |
| Location | contracts/testingDeploy/PEPEGA.sol#L1095 |
| Status | Unresolved |

## Description

According to the ERC20 specification, the transfer methods should be checked if the result is successful. Otherwise, the contract may wrongly assume that the transfer has been established.
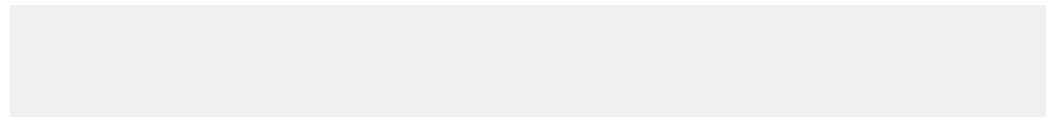
## Recommendation

The contract should check if the result of the transfer methods is successful. The team is advised to check the SafeERC20 library from the Openzeppelin library.

# Functions Analysis

| Contract | Type | Bases | | |
|---|---|---|---|---|
| | Function Name | Visibility | Mutability | Modifiers |
| | | | | |
| Context | Implementation | | | |
| | _msgSender | Internal | | |
| | _msgData | Internal | | |
| | | | | |
| Ownable | Implementation | Context | | |
| | | Public | ✓ | - |
| | owner | Public | | - |
| | renounceOwnership | Public | ✓ | onlyOwner |
| | transferOwnership | Public | ✓ | onlyOwner |
| | _transferOwnership | Internal | ✓ | |
| | | | | |
| IERC20 | Interface | | | |
| | totalSupply | External | | - |
| | balanceOf | External | | - |
| | transfer | External | ✓ | - |
| | allowance | External | | - |
| | approve | External | ✓ | - |
| | transferFrom | External | ✓ | - |

| | | | | |
|---|---|---|---|---|
| **IERC20Metadata** | Interface | IERC20 | | |
| | name | External | | - |
| | symbol | External | | - |
| | decimals | External | | - |
| | | | | |
| **ERC20** | Implementation | Context, IERC20, IERC20Metadata | | |
| | | Public | ✓ | - |
| | name | Public | | - |
| | symbol | Public | | - |
| | decimals | Public | | - |
| | totalSupply | Public | | - |
| | balanceOf | Public | | - |
| | transfer | Public | ✓ | - |
| | allowance | Public | | - |
| | approve | Public | ✓ | - |
| | transferFrom | Public | ✓ | - |
| | increaseAllowance | Public | ✓ | - |
| | decreaseAllowance | Public | ✓ | - |
| | _transfer | Internal | ✓ | |
| | _mint | Internal | ✓ | |
| | _burn | Internal | ✓ | |

| | _approve | Internal | ✓ | |
| | _beforeTokenTransfer | Internal | ✓ | |
| | _afterTokenTransfer | Internal | ✓ | |
| | | | | |
| **SafeMath** | Library | | | |
| | tryAdd | Internal | | |
| | trySub | Internal | | |
| | tryMul | Internal | | |
| | tryDiv | Internal | | |
| | tryMod | Internal | | |
| | add | Internal | | |
| | sub | Internal | | |
| | mul | Internal | | |
| | div | Internal | | |
| | mod | Internal | | |
| | sub | Internal | | |
| | div | Internal | | |
| | mod | Internal | | |
| | | | | |
| **Pepega** | Implementation | ERC20, Ownable | | |
| | | Public | ✓ | ERC20 |
| | | External | Payable | - |
| | launched | Internal | | |

| | launch | Public | ✓ | onlyOwner |
|---|---|---|---|---|
| | removeLimits | External | ✓ | onlyOwner |
| | updateSwapTokensAtAmount | External | ✓ | onlyOwner |
| | updateMaxTxnAmount | External | ✓ | onlyOwner |
| | updateMaxWalletAmount | External | ✓ | onlyOwner |
| | excludeFromMaxTransaction | Public | ✓ | onlyOwner |
| | updateSwapEnabled | External | ✓ | onlyOwner |
| | updateBuyFees | External | ✓ | onlyOwner |
| | updateSellFees | External | ✓ | onlyOwner |
| | excludeFromFees | Public | ✓ | onlyOwner |
| | setAutomatedMarketMakerPair | Public | ✓ | onlyOwner |
| | _setAutomatedMarketMakerPair | Private | ✓ | |
| | updateMarketingWallet | External | ✓ | onlyOwner |
| | isExcludedFromFees | Public | | - |
| | _transfer | Internal | ✓ | |
| | swapTokensForBnb | Private | ✓ | |
| | addLiquidity | Private | ✓ | |
| | swapBack | Private | ✓ | |
| | airdrop | External | ✓ | onlyOwner |
| | withdrawETH | External | ✓ | onlyOwner |
| | withdrawToken | External | ✓ | onlyOwner |

# Inheritance Graph
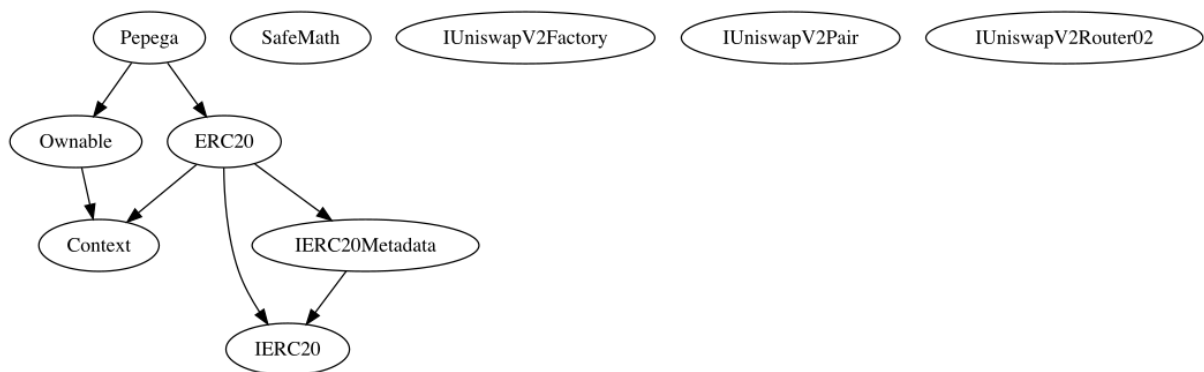
# Flow Graph
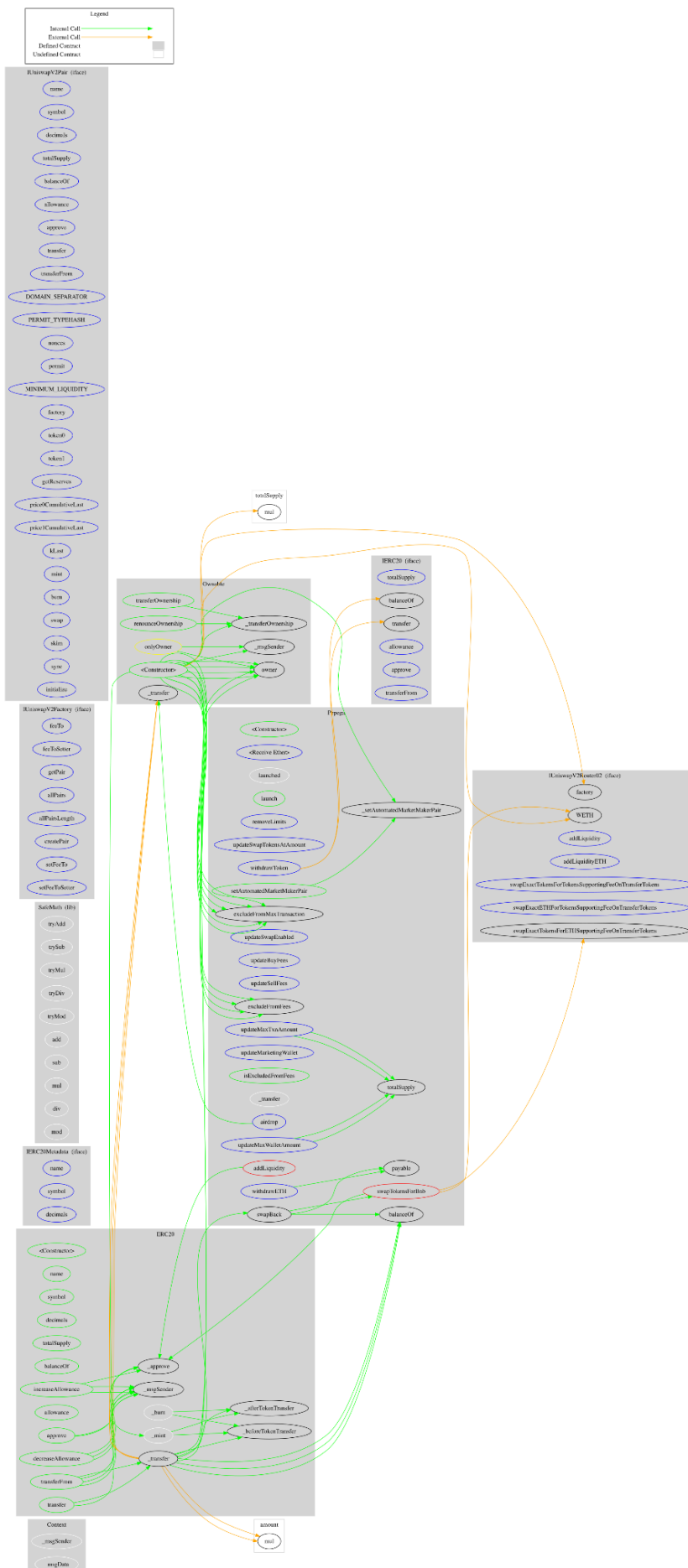
# Summary

Pepega contract implements a token mechanism. This audit investigates security issues, business logic concerns and potential improvements. There are some functions that can be abused by the owner like stop transactions. A multi-wallet signing pattern will provide security against potential hacks. Temporarily locking the contract or renouncing ownership will eliminate all the contract threats. There is also a limit of max 10% fees.

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Cyberscope is a blockchain cybersecurity company that was founded with the vision to make web3.0 a safer place for investors and developers. Since its launch, it has worked with thousands of projects and is estimated to have secured tens of millions of investors' funds.

Cyberscope is one of the leading smart contract audit firms in the crypto space and has built a high-profile network of clients and partners.

**The Cyberscope team**

https://www.cyberscope.io