VITAL BLOCK

Security Assessment

ARBIDEX

Vital Block Verified on April 29th, 2023

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PREPARED FOR:

ARBIDEX

INTRODUCTION

Auditing Company	**VITAL BLOCK SECURITY**
Client Project	**ARBIDEX**
Methodology	Automated Analysis, Manual Code Review
Language	Solidity
License	**MIT**
Contracts Address	NoDelegateCall.sol ProtocolFeeSplitter.sol UniswapV3Factory.sol UniswapV3Pool.sol UniswapV3PoolDeployer.sol
Network	**ARBITRUM CHAIN**
Optimization	**200 RUNS**
Token Type	ERC20
Website	https://www.arbidex.fi/
Telegram	https://t.me/Abridexchat
Twitter	https://twitter.com/ArbidexFi
Discord	https://discord.gg/5bzrfdDxK6
Prelim Report Date	MAY 01, 2023
Final Report Date	MAY 01, 2023

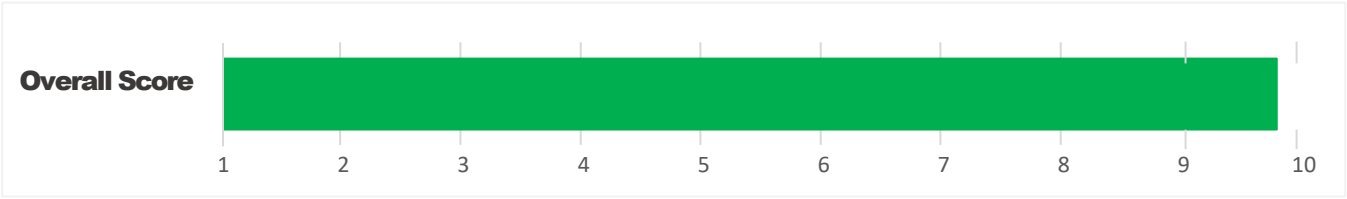
Verify the authenticity of this report on our GitHub Repo: https://www.github.com/vital-block

EXECUTIVE SUMMARY

Vital Block has performed the automated and manual analysis of the ARBIDEX Sol code. The code was reviewed for common contract vulnerabilities and centralized exploits. Here's a quick audit summary:

Status	Critical !	Major "	Medium #	Minor $	Unknown %
Open	0	0	0	8	1
Informational	0	0	0	8	0
Resolved	0	0	0	0	0
Noteworty OnlyOwner Privileges	Set Taxes and Ratios, Airdrop, Set Protection Settings, Set Reward Properties, Set Reflector Settings, Set Swap Settings, Set Pair and Router				

ARBIDEX Smart contract has achieved the following score: 98.0



Please note that smart contracts deployed on blockchains aren't resistant to exploits, vulnerabilities and/or hacks. Blockchain and cryptography assets utilize new and emerging technologies. These technologies present a high level of ongoing risks. For a detailed understanding of risk severity, source code vulnerability, and audit limitations, kindly review the audit report thoroughly.

Please note that centralization privileges regardless of their inherited risk status - constitute an elevated impact on smart contract safety and security.

SCOPE OF WORK

Vital Block was consulted by ARBIDEX to conduct the smart contract audit of its .Sol source code. The audit scope of work is strictly limited to mentioned .SOL file only:

- NoDelegateCall.sol
- ProtocolFeeSplitter.sol
- UniswapV3Factory.sol
- UniswapV3Pool.sol
- UniswapV3PoolDeployer.sol

External contracts and/or interfaces dependencies are not checked due to being out of scope.

Verify audited contract's contract address and deployed link below:

Contract Code Audited.
NoDelegateCall.sol ProtocolFeeSplitter.sol UniswapV3Factory.sol UniswapV3Pool.sol UniswapV3PoolDeployer.sol

Contract Name	**ARBIDEX**
Blockchain	**Arbitrum Network**

AUDIT METHODOLOGY

Smart contract audits are conducted using a set of standards and procedures. Mutual collaboration is essential to performing an effective smart contract audit. Here's a brief overview of Vital Block auditing process and methodology:

CONNECT

- **The onboarding team gathers source codes, and specifications to make sure we understand the size, and scope of the smart contract audit.**

AUDIT

- **Automated analysis is performed to identify common contract vulnerabilities. We may use the following third-party frameworks and dependencies to perform the automated analysis:**
  - **Remix IDE Developer Tool**
  - **Open Zeppelin Code Analyzer**
  - **SWC Vulnerabilities Registry**
  - **DEX Dependencies, e.g., Pancakeswap, Uniswap**
- **Simulations are performed to identify centralized exploits causing contract and/or trade locks.**
- **A manual line-by-line analysis is performed to identify contract issues and centralized privileges. We may inspect below mentioned common contract vulnerabilities, and centralized exploits:**

Centralized Exploits	○ **Token Supply Manipulation** ○ **Access Control and Authorization** ○ **Assets Manipulation** ○ **Ownership Control** ○ **Liquidity Access** ○ **Stop and Pause Trading** ○ **Ownable Library Verification**

Common Contract Vulnerabilities	○ Integer Overflow ○ Lack of Arbitrary limits ○ Incorrect Inheritance Order ○ Typographical Errors ○ Requirement Violation ○ Gas Optimization ○ Coding Style Violations ○ Re-entrancy ○ Third-Party Dependencies ○ Potential Sandwich Attacks ○ Irrelevant Codes ○ Divide before multiply ○ Conformance to Solidity Naming Guides ○ Compiler Specific Warnings ○ Language Specific Warnings

REPORT

- The auditing team provides a preliminary report specifying all the checks which have been performed and the findings thereof.
- The client's development team reviews the report and makes amendments to the codes.
- The auditing team provides the final comprehensive report with open and unresolved issues.

PUBLISH

- The client may use the audit report internally or disclose it publicly.

ℹ It is important to note that there is no pass or fail in the audit, it is recommended to view the audit

as an unbiased assessment of the safety of solidity codes.

RISK CATEGORIES

Smart contracts are generally designed to hold, approve, and transfer tokens. This makes them very tempting attack targets. A successful external attack may allow the external attacker to directly exploit. A successful centralization-related exploit may allow the privileged role to directly exploit. All risks which are identified in the audit report are categorized here for the reader to review:

Risk Type	Definition
Critical ! 🔴	These risks could be exploited easily and can lead to asset loss, data loss, asset, or data manipulation. They should be fixed right away.
Major " 🟠	These risks are hard to exploit but very important to fix, they carry an elevated risk of smart contract manipulation, which can lead to high-risk severity.
Medium # 🟡	These risks should be fixed, as they carry an inherent risk of future exploits, and hacks which may or may not impact the smart contract execution. Low-risk re-entrancy-related vulnerabilities should be fixed to deter exploits.
Minor $ 🟢	These risks do not pose a considerable risk to the contract or those who interact with it. They are code-style violations and deviations from standard practices. They should be highlighted and fixed nonetheless.
Unknown % 🟤	These risks pose uncertain severity to the contract or those who interact with it. They should be fixed immediately to mitigate the risk uncertainty.

All statuses which are identified in the audit report are categorized here for the reader to review:

Status Type	Definition
Open	Risks are open.
Acknowledged	Risks are acknowledged, but not fixed.
Resolved	Risks are acknowledged and fixed.

CENTRALIZED PRIVILEGES

Centralization risk is the most common cause of cryptography asset loss. When a smart contract has a privileged role, the risk related to centralization is elevated.

There are some well-intended reasons have privileged roles, such as:

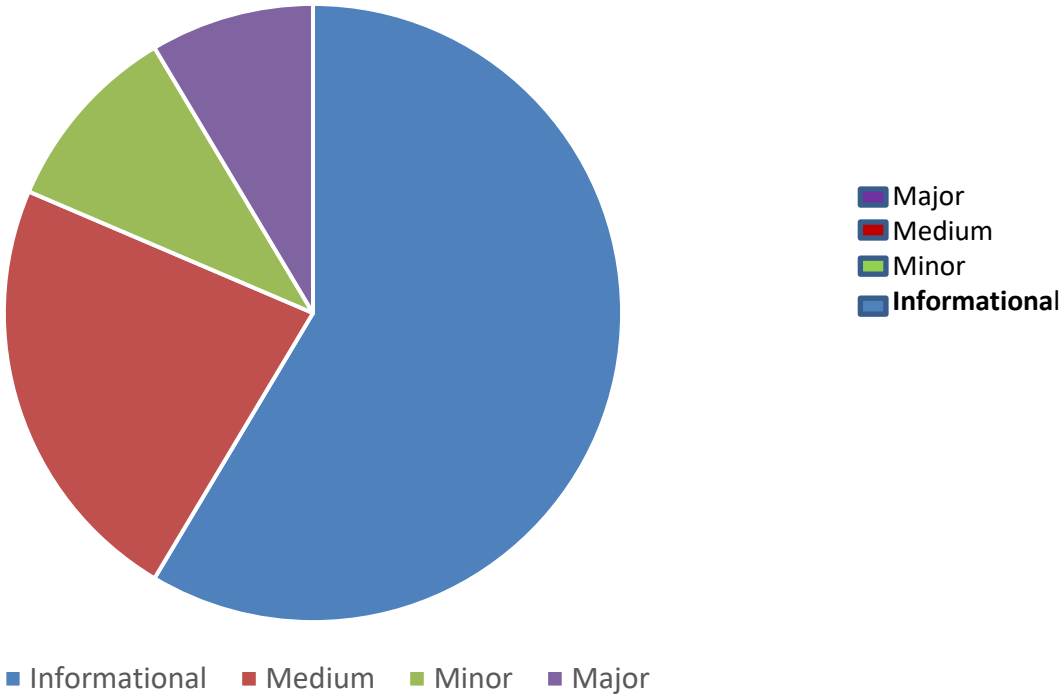
- **Privileged roles can be granted the power to** pause() **the contract in case of an external attack.**
- **Privileged roles can use functions like,** include(), **and** exclude() **to add or remove wallets from fees, swap checks, and transaction limits. This is useful to run a presale and to list on an exchange.**

Authorizing privileged roles to externally-owned-account (EOA) is dangerous. Lately, centralization-related losses are increasing in frequency and magnitude.

- **The client can lower centralization-related risks by implementing below mentioned practices:**
- **Privileged role's private key must be carefully secured to avoid any potential hack.**
- **Privileged role should be shared by multi-signature (multi-sig) wallets.**
- **Authorized privilege can be locked in a contract, user voting, or community DAO can be introduced to unlock the privilege.**
- **Renouncing the contract ownership, and privileged roles.**
- **Remove functions with elevated centralization risk.**

Understand the project's initial asset distribution. Assets in the liquidity pair should be locked. Assets outside the liquidity pair should be locked with a release schedule.

Finding Summary



Status Icon Definitions

✅	Resolved	🚧	In Progress	ℹ️	Ignored (pro)
❌	Not Resolved	❓	Incorrect	🚫	Ignored (con)

Vulnerability Run check

risk detection

Contract source code verified

This token contract is open source, see the contract code for details. Token contracts that do not provide source code are likely to have malicious functions to defraud users of assets.

No bonus issue

Additional issuance functions are transparent or non-existent. Hidden minting may increase the number of tokens in circulation and affect the price of tokens.

Owner cannot change balance

The contract owner does not have the right to modify the token balance of other addresses.

no agency

There is no proxy in the contract. A proxy contract means that the contract owner can modify the functionality of the token and possibly affect the price.

Contract permissions cannot be regained (false abandonment)

If this function exists, it is possible for the project owner to regain ownership even if they abandon it.

Pixiu risk

This doesn't seem to be Pixiu

We did not find any code preventing the token sale.

no anti whale

There is no limit to the number of token transactions. The number of fraudulent token transactions may be limited (Pixiu risk).

no whitelist feature

Discover whitelist functions

No whitelist function

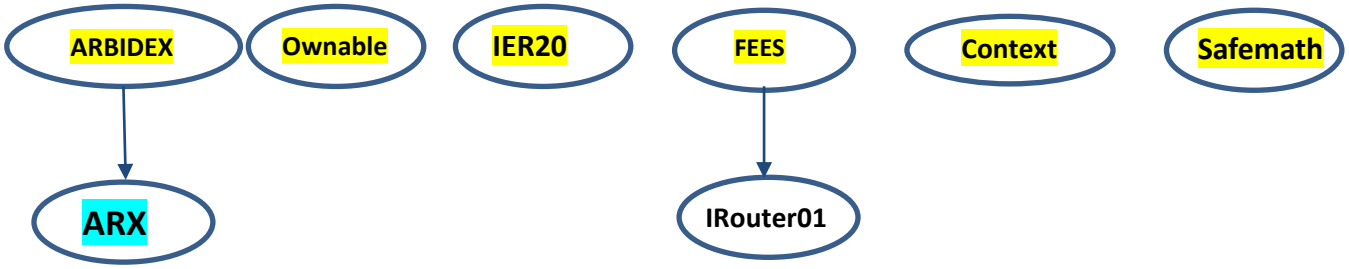
Whitelist function found

The token contract does not have a transaction cooling function. If there is a transaction cooling function, users will not be able to sell tokens within a certain period of time or generate blocks after purchase.

no blacklist function

Does not include whitelist functionality.

INHERITANCE GRAPH



Identifier	Definition	Severity
ProtocolFeeSplitter.sol	**Centralization privileges of ARBIDEX**	**Medium** # 🟡

Vulnerability 0 : No important security issue detected.
Threat level: Low

Home | Protocolfeesplitter.sol

```
13
14      address public arbidexAddress; // will receive 90% from collected protocol fees
15      address public managementAddress; // will receive 10% from collected protocol fees
16
17      uint256 public constant BASE = 1e18; //100%
18      uint256 public constant MANAGEMENT_PERCENTAGE = 10000000000000000; // 10%
19
20      /// @notice Emitted when factory address is set
21      event SetFactoryAddress(address indexed factory);
22
23      constructor(address _arbidexAddress, address _managementAddress) {
24          arbidexAddress = _arbidexAddress;
25          managementAddress = _managementAddress;
26      }
27
28      function setFactoryAddress(address _factoryAddress) external {
29          require(factoryAddress == address(0), "already initialized");
30
31          factoryAddress = _factoryAddress;
32
33          emit SetFactoryAddress(_factoryAddress);
34      }
```

0 listen on all transactions Search with transaction hash or address

ATV-01 POSSIBLE OVERFLOW

Category	Severity	Location	Status
Status Mathematical Operations	**Minor**	contracts/UniswapV3Factory.sol	INFORMATIONAL

Description

mapping variables can be declared as constant using the constant keyword. This means that the value of the state variable cannot be changed after it has been set. Additionally, the constant variables decrease gas consumption of the corresponding transaction.

```
mapping(uint24 => int24) public override feeAmountTickSpacing;
  /// @inheritdoc IUniswapV3Factory
  mapping(address => mapping(address => mapping uint24 => address))) public override getPool
```

Recommendation

Constant state variables can be useful when the contract wants to ensure that the mapping of a state variable cannot be changed by any function in the contract. This can be useful for storing values that are important to the contract's behavior, such as the contract's address or the maximum number of times a certain function can be called. The team is advised to add the constant keyword to state variables that never change.

ATV-02 POSSIBLE OVERFLOW

Category	Severity	Location	Status
Status Mathematical Operations	**Minor**	contracts/UniswapV3Factory.sol (56-61)	INFORMATIONAL

Description

Where parameters.amountOutUsed is a require and override In is a memory As these two are multiplied together in an unchecked block, they may overflow

```
require(tokenA != tokenB);
    (address token0, address token1) = tokenA < tokenB ? (tokenA, tokenB) : (tokenB, tokenA);
    require(token0 != address(0));
    int24 tickSpacing = feeAmountTickSpacing[fee];
    require(tickSpacing != 0);
    require(getPool[token0][token1][fee] == address(0))
```

Recommendation

We recommend either checking for overflow in this case, or ensuring that the require is close enough it will never cause an overflow

STV-03 POSSIBLE OVERFLOW

Category	Severity	Location	Status
Bad datatype	**Minor**	UniswapV3Factory.sol (45.48.59.60.62)	INFORMATIONAL

Description

The types of the parameters and returned value could be made more specific.
IERC20 for "tokenA" and "tokenB", and IUniswapV3Pool for "pool"

```
5 address tokenA, address tokenB, 48 ) external view returns( address pool ); 59 address
tokenA, 60 address tokenB, 62 ) external returns( address pool );
```

Comment

Avoid creating dependencies from interfaces.

STV-04 Redundant indexing

Category	Severity	Location	Status
Suboptimal	**Minor**	UniswapV3Factory.sol	INFORMATIONAL

Description

"tickSpacing"

```
event FeeAmountEnabled(uint24 indexed fee, int24 indexed, → tickSpacing);
```

Recommendation

The "tickSpacing" parameter should probably not be indexed.

STV-05 POSSIBLE OVERFLOW

Category	Severity	Location	Status
Flaw	**Minor**	UniswapV3Pool.sol (662.663.664.665)	INFORMATIONAL

Description

ensure that you do not overshoot the min/max tick, as the tick bitmap is not aware of these bound

```
if (step.tickNext < TickMath.MIN_TICK) {
        step.tickNext = TickMath.MIN_TICK;
} else if (step.tickNext > TickMath.MAX_TICK) {
        step.tickNext = TickMath.MAX_TICK;
                                }
```

Recommendation

compute values to swap to the target tick, price limit, or point where input/output amount is exhausted

ATV-06 Redundant Parameters

Category	Severity	Location	Status
Unclear behavior	**Minor**	UniswapV3PoolActions.sol	INFORMATIONAL

Description

These parameters look redundant. Why one would want to collect only a part of the fees?

```
/// @notice Collects fees owed to a position
```

Comment

Tokens may be locked due to failure in token contract.

ATV-07 POSSIBLE OVERFLOW

Category	Severity	Location	Status
Documentation	**Minor**	UniswapV3PoolDeployer.sol	INFORMATIONAL

Description

`@dev T h i s i s u se d` to remove a l l c o n s t r u c t o r a rg ume n t s f rom t h e ,→ p o o l e n a b l i n g p o o l a d d r e s s e s to be computed c h e a p l y.

```
pool = address(new UniswapV3Pool{salt: keccak256(abi.encode(token0, token1, fee))}());
delete parameters;
```

Comment

It would be good to mention here that pool contracts are created via `CREATE2` opcode.

ATV-08 BAD NAMING

Category	Severity	Location	Status
Bad naming	**Minor**	UniswapV3PoolDeployer.sol	INFORMATIONAL

Description

The function name is too generic.

```
functionparameters()
```

Recommendation

Consider making it more specific, like "poolParameters".

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General Detectors

Incorrect Solidity Version
This contract uses an unconventional or very old version of Solidity.

Attention Required

Public Functions Should be Declared External
Some functions in this contract should be declared as external in order to save gas.

Attention Required

State Variables Should be Declared Constant
Some state variables in this contract should be declared as constant

Attention Required

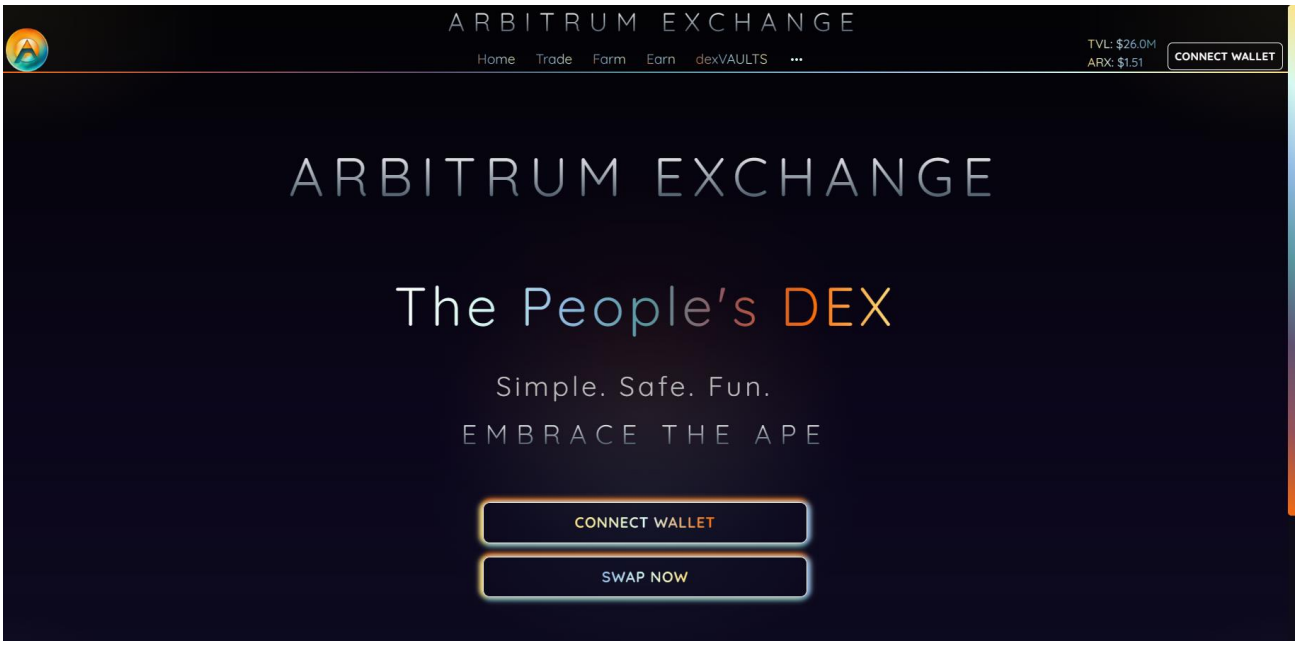
- No vulnerable withdrawal functions found
- No reentrancy risk found
- No locks detected
- Verified source code found
- No mintable risks found
- Users can always transfer their tokens
- Contract cannot be upgraded
- Wallets cannot be blacklisted from transfering the token
- No transfer fees found
- Token can be sold through regular AMMs
- No transfer limits found
- No ERC20 approval vulnerability found
- Contract owner cannot abuse ERC20 approvals
- No ERC20 interface errors found
- No blocking loops found
- No centralized balance controls found
- No transfer cooldown times found
- No approval restrictions found
- No external calls detected
- No dumping risks found
- No compiler version inconsistencies found
- No unchecked call responses found
- No vulnerable self-destruct functions found
- No assertion vulnerabilities found
- No old solidity code found
- No external delegated calls found
- No external call dependency found
- No vulnerable authentication calls found
- No invalid character typos found
- No RTL characters found
- No dead code found
- No risky data allocation found
- No uninitialized state variables found
- No uninitialized storage variables found
- No vulnerable initialization functions found
- No risky data handling found
- No number accuracy bug found
- No out-of-range number vulnerability found

MANUAL REVIEW

BLOX FINANCE: Arbidex's, a next-generation DEX on Arbitrum designed for unparalleled efficiency, flexibility, and user-friendliness. Arbidex showcases impressive features such as Quantum Concentrated Liquidity for enhanced capital efficiency, Quantum Farming with triple rewards, customizable Quantum Strategies, and the highest real yield in the DeFi ecosystem. (🤍,🤍)

ARBISHIELD: ARBUIDEX
Ticker: ARX
TOTAL SUPPLY: 20,000,000
Decimals: 18
Chain/Standard: Arbitrum Network

Outstanding Features of ARBIDEX LAUNCHED On Arbitrum Network



ISSUES CHECKING STATUS

	Issue Description	Checking Status
1.	Compiler errors.	PASSED
2.	Race Conditions and reentrancy. Cross-Function Race Conditions.	PASSED
3.	Possible Delay In Data Delivery.	PASSED
4.	Oracle calls.	PASSED
5.	Front Running.	PASSED
6.	Sol. Dependency.	PASSED
7.	Integer Overflow And Underflow.	PASSED
8.	DoS with Revert.	PASSED
9.	Dos With Block Gas Limit.	PASSED
10.	Methods execution permissions.	PASSED
11.	Economy Model of the contract.	PASSED
12.	The Impact Of Exchange Rate On the solidity Logic.	PASSED
13.	Private use 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.	Save Upon solidity contract Implementation and Usage.	PASSED
21.	Fallback Function Security	PASSED

AUDIT RESULT

PASSED

Identifier	Definition	Severity
TEN-030	Transfers User's Tokens	Minor

```
function setFactoryAddress(address _factoryAddress) external {
        require(factoryAddress == address(0), "already initialized");

        factoryAddress = _factoryAddress;

        emit SetFactoryAddress(_factoryAddress)
```

Location: UniswapV3PoolDeployer.sol

Alleviation:

No user has the authority to transfer the balance of any user's address if the user has granted allowance. The contract does not subtract the allowance in the transferFrom() method,

RECOMMENDATION

Deployer and/or contract owner private keys are secured carefully.

Please refer to PAGE-09 CENTRALIZED PRIVILEGES for a detailed understanding.

ALLEVIATION

ARBIDEX project team understands the centralization risk. Some functions are provided privileged access to ensure a good runtime behaviour in the project

Identifier	Definition	Severity
TOB-08	Third Party Dependencies	Minor

A smart contract is interacting with third-party protocols e.g., Uniswap, Pancakeswap router, cashier contract,

And protections contract. The scope of the audit treats third-party entities as black boxes and assumes their functional correctness. However, in the real world, third parties can be compromised and exploited. Moreover, upgrades in third parties can create severe impacts, e.g., increased transactional fees, deprecation of previous routers, etc.

RECOMMENDATION

Inspect and validate third party dependencies regularly, and mitigate severe impacts whenever necessary.

DISCLAIMERS

Vital Block Security provides the easy-to-understand audit of Solidity, Move, and Raw source codes (commonly known as smart contracts).

The smart contract for this particular audit was analyzed for common contract vulnerabilities, and centralization exploits. This audit report makes no statements or warranties on the security of the code. This audit report does not provide any warranty or guarantee regarding the absolute bug-free nature of the smart contract analyzed, nor do they provide any indication of the client's business, business model, or legal compliance. This audit report does not extend to the compiler layer, any other areas beyond the programming language, or other programming aspects that could present security risks. Cryptographic tokens are emergent technologies, they carry high levels of technical risks and uncertainty. You agree that your access and/or use, including but not limited to any services, reports, and materials, will be at your sole risk on an as-is, where-is, and as-available basis. This audit report could include false positives, false negatives, and other unpredictable results.

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Vital Block is Dedicated to Making Defi & Web3 A Safer Place. We are Powered by Security engineers, developers, UI experts, and blockchain enthusiasts. Our team currently consists of 5 core members, and 4+ casual contributors.

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