Audit Report

CW20 Blocklist

v1.0

May 25, 2022

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This audit has been performed by

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Introduction

Purpose of This Report

Oak Security has been engaged by Terraform Labs Limited to perform a security audit of the CW20 Blocklist smart contract.

The objectives of the audit are as follows:

1. Determine the correct functioning of the protocol, in accordance with the project specification.
2. Determine possible vulnerabilities, which could be exploited by an attacker.
3. Determine smart contract bugs, which might lead to unexpected behavior.
4. Analyze whether best practices have been applied during development.
5. Make recommendations to improve code safety and readability.

This report represents a summary of the findings.

As with any code audit, there is a limit to which vulnerabilities can be found, and unexpected execution paths may still be possible. The author of this report does not guarantee complete coverage (see disclaimer).

Codebase Submitted for the Audit

The audit has been performed on the following GitHub repository:

https://github.com/octalmage/terra-blocklist

Commit hash: `abddbe3389537156429b82f0953c32823f17a416`

Methodology

The audit has been performed in the following steps:

1. Gaining an understanding of the code base's intended purpose by reading the available documentation.
2. Automated source code and dependency analysis.
3. Manual line by line analysis of the source code for security vulnerabilities and use of best practice guidelines, including but not limited to:
    a. Race condition analysis
    b. Under-/overflow issues
    c. Key management vulnerabilities
4. Report preparation

Functionality Overview

The submitted code implements a fungible token that modifies the CW20 functionality to allow the minter to add or remove addresses to or from a blocklist. Funds of an address on that blocklist cannot be transferred or withdrawn anymore. Additionally, the minter can burn the funds of any address on that blocklist.

How to Read This Report

This report classifies the issues found into the following severity categories:

Severity	Description
Critical	A serious and exploitable vulnerability that can lead to loss of funds, unrecoverable locked funds, or catastrophic denial of service.
Major	A vulnerability or bug that can affect the correct functioning of the system, lead to incorrect states or denial of service.
Minor	A violation of common best practices or incorrect usage of primitives, which may not currently have a major impact on security, but may do so in the future or introduce inefficiencies.
Informational	Comments and recommendations of design decisions or potential optimizations, that are not relevant to security. Their application may improve aspects, such as user experience or readability, but is not strictly necessary. This category may also include opinionated recommendations that the project team might not share.

The status of an issue can be one of the following: **Pending,** **Acknowledged**, or **Resolved**.

Note that audits are an important step to improving the security of smart contracts and can find many issues. However, auditing complex codebases has its limits and a remaining risk is present (see disclaimer).

Users of the system should exercise caution. In order to help with the evaluation of the remaining risk, we provide a measure of the following key indicators: **code complexity**, **code readability**, **level of documentation**, and **test coverage**. We include a table with these criteria below.

Note that high complexity or low test coverage does not necessarily equate to a higher risk, although certain bugs are more easily detected in unit testing than in a security audit and vice versa.

Summary of Findings

No	Description	Severity	Status
1	Overflow checks are not enabled for the release profile, which can lead to a loss of funds	Critical	Resolved
2	Users can evade having blocked funds destroyed by using uppercase addresses	Major	Resolved
3	Missing validations during contract instantiation	Minor	Resolved
4	One-step minter update increase risk of lost minter permissions	Minor	Acknowledged
5	Consider using time locks to automatically unblock addresses in the event of a lost/compromised minter private key	Minor	Acknowledged
6	Blocked addresses can receive tokens	Informational	Acknowledged
7	Removal of `Burn` and `BurnFrom` may impact contract composability	Informational	Acknowledged
8	Duplicate code impacts maintainability	Informational	Resolved
9	`cw20-blocklist` modifies `cw20-base` interface, which negatively impacts composability and is not documented correctly	Informational	Resolved
10	Testing wallet seed phrase and private keys are exposed	Informational	Resolved
11	Outdated dependencies	Informational	Acknowledged

Code Quality Criteria

Criteria	Status	Comment
Code complexity	**Low-Medium**	-
Code readability and clarity	**Medium-High**	-
Level of documentation	**Medium**	-
Test coverage	**Medium-High**	The test coverage reported by `cargo tarpaulin` is 77.88%.

Detailed Findings

1. Overflow checks are not enabled for the release profile, which can lead to a loss of funds

Severity: Critical

In `contracts/cw20-blocklist/Cargo.toml`, `overflow-checks` are not enabled for the release profile. Since there are arithmetic calculations that do not use checked calculations to prevent overflow issues in the cw20-base contract (e.g. increasing an account's balance), an overflow in production would be silently ignored.

Recommendation

We recommend enabling overflow checks in `Cargo.toml`.

Status: Resolved

2. Users can evade having blocked funds destroyed by using uppercase addresses

Severity: Major

The `cw20-blocklist` contract does maintain the blocklist with lowercase addresses, and it performs lowercasing of an address before checking whether it is on the blocklist. The underlying `cw20-base` contract, on the other hand, does not lowercase addresses.

This discrepancy allows users to evade having blocked funds destroyed, by having their balance sent to an uppercase address, rather than a lowercase one. If a user sends the `Transfer` message to a previously unused and not blocked uppercase address, the `execute_transfer` function of the `cw20-base` contract will update `BALANCES` with the uppercase address as the key. Blocklisting that address works as expected, since all blocklist checks are performed after transforming the address to lowercase, see `contracts/cw20-blocklist/src/contract.rs:195`, `211`, and `254`. If the minter now wants to burn the funds associated with that address using the `DestroyBlockedFunds` message, the `destroy_blocked_funds` function is trying to reduce `BALANCES` using the lowercased address as a key in lines `160-168`. This will fail, since the balance was stored under an uppercase address as the key.

Recommendation

We recommend lowercasing addresses in `contracts/cw20-blocklist/src/contract.rs:65`, `74`, `92`, `99`, `105`, `117` and `142`.

Status: Resolved

3. Missing validations during contract instantiation

Severity: Minor

In `contracts/cw20-blocklist/src/contract.rs:36-38`, the passed arguments `msg.name`, `msg.symbol`, and `msg.decimals` are not validated.

Without validation of `name` and `symbol`, the minter is able to pass invalid or non-printable characters that could affect front-end rendering, allow script injection, or passing strings very long strings which may inhibit usability of the token.

Without validation of `decimals`, the minter is able to pass any supported u8 value (from 0 to 255). An uncommonly large decimal point might cause issues for protocols that build on top of this contract.

Recommendation

We recommend validating that these variables are within the expected range. For instance, the `cw20-base` contract provides validation functions that ensure that the instantiated parameter values are initialized correctly, which can be found here,

Status: Resolved

4. One-step minter update increase risk of lost minter permissions

Severity: Minor

The `cw20-blocklist` contract allows the current minter to update the minter address in one single step. While this is common practice, it presents a risk for the minting permission to become lost if the new address is incorrect. A two-step minter update will allow the current minter to propose a new minter address, and then the account that is proposed as the new minter may call a separate function that will allow them to claim the minting permission and actually execute the config update.

Recommendation

We recommend implementing a two-step minter update. The flow can be as follows:

1. The current minter proposes a new minter address that is validated and lowercased.
2. The new minter account claims ownership, which applies the configuration changes.

Status: Acknowledged

5. Consider using time locks to automatically unblock addresses in the event of a lost/compromised minter private key

Severity: Minor

Throughout the codebase, the minter can perform various privileged actions such as adding and removing addresses to/from the blocklist. A blocked address will remain blacklisted until the minter decides to unblock them. In the event that the private key is lost or compromised and the minter updated, the blacklisted address may never be unblocked.

Recommendation

We recommend using time locks that specify an expiration block or time instead of a boolean blocked state. In the case of a lost/compromised minter private key, this would allow addresses to become automatically unblocked after a certain timespan (e.g. 6 months).

Status: Acknowledged

6. Blocked addresses can receive tokens

Severity: Informational

In the codebase, there are no restrictions that prevent blocked addresses from receiving tokens. Since the minter can destroy funds held by a blocked address using the `DestroyBlockedFunds` message, we recommend disallowing funds to be sent to a blocked address.

Recommendation

We recommend checking whether the recipient address is blocked in `execute_mint`, `execute_transfer`, `execute_send`, `execute_transfer_from`, and `execute_send_from`.

Status: Acknowledged

7. Removal of `Burn` and `BurnFrom` may impact contract composability

Severity: Informational

The `cw20-blocklist` contract does not include the `Burn` and `BurnFrom` messages that the `cw20-base` contract provides. This may impact composability of the `cw20-blocklist` contract with other smart contracts, that may rely on burning of funds. In the current implementation, a `Redeem` message exists, that only allows the minter to burn tokens.

Recommendation

We recommend adding `Burn` and `BurnFrom` messages and their corresponding handlers.

Status: Acknowledged

8. Duplicate code impacts maintainability

Severity: Informational

Throughout the codebase, privileged execution messages such as `AddToBlockedList`, `RemoveFromBlockedList`, `UpdateMinter`, `Redeem`, and `DestroyBlockedFunds` messages are all restricted to minter access. The logic that verifies whether `info.sender` is the minter is duplicated across the handlers for these functions, which negatively impacts the code's maintainability and readability and may lead to future errors.

Recommendation

We recommend refactoring the authentication functionality to an internal function and using it across the codebase, or performing the authentication check in the execute message entry point when a privileged execution message is called.

Status: Resolved

9. `cw20-blocklist` modifies `cw20-base` interface, which negatively impacts composability and is not documented correctly

Severity: Informational

Compared with the `cw20-base` contract, the `cw20-blocklist` contract exhibits the following modifications:

1. Minter is always set to the instantiator
2. Minting cap cannot be set
3. Initial balances cannot be provided during instantiation
4. Marketing info cannot be set or queried
5. `Burn` and `BurnFrom` messages have been removed
6. `Minter`, `AllAllowances`, `AllAccounts`, `MarketingInfo`, and `DownloadLogo` queries have been removed

This reduces the composability of the `cw20-blocklist` contract, since it may not be possible for some projects to swap a `cw20-base` contract with a `cw20-blocklist` implementation without further modification of their code. It also affects frontends and aggregation layers that may rely on some of the removed queries. Lastly, the documentation in `contracts/cw20-blocklist/README.md:3` describes that the `cw20-blocklist`

contract `extends the cw20-base to add blocklist functionality`, which is misleading.

Recommendation

We recommend adding removed functionality to comply as much as possible with the `cw20-base` interface. We also recommend updating the project description to accurately describe any differences between the contracts.

Status: Resolved

10. Testing wallet seed phrase and private keys are exposed

Severity: Informational

In `keys.terrain.js`, the testing wallet's mnemonic and private keys are hardcoded and visible to the public. Although these secrets are intended to be used purely for testing purposes, it is a violation of best practice to commit wallet seed phrases or private keys into a repository. These accounts may accidentally be used by developers on mainnet, in which case funds may be lost or permissions be exploited.

Recommendation

We recommend storing the wallet's secrets locally in a local `.env` file that is included in `.gitignore` to prevent secrets from being committed.

Status: Resolved

11. Outdated dependencies

Severity: Informational

The `cw20-blocklist` contract contains outdated dependencies, see Appendix 1.

Recommendation

We recommend running `cargo outdated` on the codebase and updating dependencies.

Status: Acknowledged

Appendix 1

```
cargo outdated
Name                                    Project                 Compat   Latest                  Kind         Platform
----                                    -------                 ------   ------                  ----         --------
block-buffer->generic-array             0.14.5                  ---      Removed                 Normal       ---
cosmwasm-crypto->digest                 0.9.0                   ---      Removed                 Normal       ---
cosmwasm-crypto->ed25519-zebra          2.2.0                   ---      3.0.0                   Normal       ---
cosmwasm-crypto->ed25519-zebra          2.2.0                   ---      Removed                 Normal       ---
cosmwasm-crypto->k256                   0.9.6                   ---      0.10.4                  Normal       ---
cosmwasm-crypto->k256                   0.9.6                   ---      Removed                 Normal       ---
cosmwasm-crypto->rand_core              0.5.1                   ---      0.6.3                   Normal       ---
cosmwasm-crypto->rand_core              0.5.1                   ---      Removed                 Normal       ---
cosmwasm-crypto->thiserror              1.0.30                  1.0.31   1.0.31                  Normal       ---
cosmwasm-crypto->thiserror              1.0.30                  1.0.31   Removed                 Normal       ---
cosmwasm-derive->syn                    1.0.86                  1.0.94   1.0.94                  Normal       ---
cosmwasm-derive->syn                    1.0.86                  1.0.94   Removed                 Normal       ---
cosmwasm-schema                         0.16.3                  0.16.7   1.0.0                   Development  ---
cosmwasm-schema->serde_json             1.0.79                  1.0.81   1.0.81                  Normal       ---
cosmwasm-std                            0.16.3                  0.16.6   1.0.0                   Normal       ---
cosmwasm-std->base64                    0.13.0                  ---      Removed                 Normal       ---
cosmwasm-std->cosmwasm-crypto           0.16.3                  0.16.7   1.0.0                   Normal
cfg(not(target_arch =
                                                                                                                "wasm32"))
cosmwasm-std->cosmwasm-crypto           0.16.3                  0.16.7   Removed                 Normal
cfg(not(target_arch =
                                                                                                                "wasm32"))
cosmwasm-std->cosmwasm-derive           0.16.3                  0.16.7   1.0.0                   Normal       ---
cosmwasm-std->cosmwasm-derive           0.16.3                  0.16.7   Removed                 Normal       ---
cosmwasm-std->schemars                  0.8.8                   ---      Removed                 Normal       ---
cosmwasm-std->serde                     1.0.136                 1.0.137  1.0.137                 Normal       ---
cosmwasm-std->serde                     1.0.136                 1.0.137  Removed                 Normal       ---
cosmwasm-std->serde-json-wasm           0.3.2                   ---      0.4.1                   Normal       ---
cosmwasm-std->serde-json-wasm           0.3.2                   ---      Removed                 Normal       ---
cosmwasm-std->thiserror                 1.0.30                  1.0.31   1.0.31                  Normal       ---
cosmwasm-std->thiserror                 1.0.30                  1.0.31   Removed                 Normal       ---
cosmwasm-std->uint                      0.9.1                   ---      0.9.3                   Normal       ---
cosmwasm-std->uint                      0.9.1                   ---      Removed                 Normal       ---
cpufeatures->libc                       0.2.118                 0.2.125  0.2.125                 Normal
aarch64-apple-darwin
cpufeatures->libc                       0.2.118                 0.2.125  Removed                 Normal
aarch64-apple-darwin
crypto-bigint->generic-array            0.14.5                  ---      Removed                 Normal       ---
crypto-bigint->rand_core                0.6.3                   ---      Removed                 Normal       ---
crypto-bigint->subtle                   2.4.1                   ---      Removed                 Normal       ---
crypto-bigint->zeroize                  1.4.3                   ---      1.5.5                   Normal       ---
crypto-bigint->zeroize                  1.4.3                   ---      Removed                 Normal       ---
crypto-mac->generic-array               0.14.5                  ---      Removed                 Normal       ---
crypto-mac->subtle                      2.4.1                   ---      Removed                 Normal       ---
curve25519-dalek->byteorder             1.4.3                   ---      Removed                 Normal       ---
curve25519-dalek->digest                0.9.0                   ---      Removed                 Normal       ---
curve25519-dalek->rand_core             0.5.1                   ---      Removed                 Normal       ---
curve25519-dalek->subtle                2.4.1                   ---      Removed                 Normal       ---
curve25519-dalek->zeroize               1.4.3                   ---      1.5.5                   Normal       ---
curve25519-dalek->zeroize               1.4.3                   ---      Removed                 Normal       ---
cw-controllers                          0.9.1                   ---      0.13.2                  Normal       ---
cw-controllers->cosmwasm-std            0.16.3                  0.16.6   1.0.0                   Normal       ---
cw-controllers->cw-storage-plus         0.9.1                   ---      0.13.2                  Normal       ---
cw-controllers->cw0                     0.9.1                   ---      Removed                 Normal       ---
cw-controllers->serde                   1.0.136                 1.0.137  1.0.137                 Normal       ---
cw-controllers->thiserror               1.0.30                  1.0.31   1.0.31                  Normal       ---
cw-storage-plus                         0.9.1                   ---      0.13.2                  Normal       ---
cw-storage-plus->cosmwasm-std           0.16.3                  0.16.6   1.0.0                   Normal       ---
cw-storage-plus->serde                  1.0.136                 1.0.137  1.0.137                 Normal       ---
cw0                                     0.9.1                   ---      0.10.3                  Normal       ---
cw0->cosmwasm-std                       0.16.3                  0.16.6   1.0.0                   Normal       ---
cw0->cosmwasm-std                       0.16.3                  0.16.6   Removed                 Normal       ---
cw0->schemars                           0.8.8                   ---      Removed                 Normal       ---
cw0->serde                              1.0.136                 1.0.137  1.0.137                 Normal       ---
cw0->serde                              1.0.136                 1.0.137  Removed                 Normal       ---
cw0->thiserror                          1.0.30                  1.0.31   1.0.31                  Normal       ---
cw0->thiserror                          1.0.30                  1.0.31   Removed                 Normal       ---
cw2                                     0.9.1                   ---      0.13.2                  Normal       ---
cw2->cosmwasm-std                       0.16.3                  0.16.6   1.0.0                   Normal       ---
cw2->cw-storage-plus                    0.9.1                   ---      0.13.2                  Normal       ---
cw2->serde                              1.0.136                 1.0.137  1.0.137                 Normal       ---
cw20                                    0.9.1                   ---      0.13.2                  Normal       ---
cw20->cosmwasm-std                      0.16.3                  0.16.6   1.0.0                   Normal       ---
cw20->cw0                               0.9.1                   ---      Removed                 Normal       ---
cw20->serde                             1.0.136                 1.0.137  1.0.137                 Normal       ---
cw20-base                               0.9.1                   ---      0.13.2                  Normal       ---
cw20-base->cosmwasm-std                 0.16.3                  0.16.6   1.0.0                   Normal       ---
cw20-base->cw-storage-plus              0.9.1                   ---      0.13.2                  Normal       ---
cw20-base->cw0                          0.9.1                   ---      Removed                 Normal       ---
cw20-base->cw2                          0.9.1                   ---      0.13.2                  Normal       ---
cw20-base->cw20                         0.9.1                   ---      0.13.2                  Normal       ---
cw20-base->serde                        1.0.136                 1.0.137  1.0.137                 Normal       ---
cw20-base->thiserror                    1.0.30                  1.0.31   1.0.31                  Normal       ---
der->const-oid                          0.6.2                   ---      0.7.1                   Normal       ---
der->const-oid                          0.6.2                   ---      Removed                 Normal       ---
digest->generic-array                   0.14.5                  ---      Removed                 Normal       ---
ecdsa->der                              0.4.5                   ---      0.5.1                   Normal       ---
ecdsa->der                              0.4.5                   ---      Removed                 Normal       ---
ecdsa->elliptic-curve                   0.10.6                  ---      0.11.12                 Normal       ---
ecdsa->elliptic-curve                   0.10.6                  ---      Removed                 Normal       ---
ecdsa->hmac                             0.11.0                  ---      Removed                 Normal       ---
ecdsa->signature                        1.3.2                   ---      1.4.0                   Normal       ---
```

```
ecdsa->signature                          1.3.2                          ---      Removed                          Normal       ---
ed25519-zebra->curve25519-dalek           3.2.0                          ---      Removed                          Normal       ---
ed25519-zebra->hex                        0.4.3                          ---      Removed                          Normal       ---
ed25519-zebra->rand_core                  0.5.1                          ---      0.6.3                            Normal       ---
ed25519-zebra->rand_core                  0.5.1                          ---      Removed                          Normal       ---
ed25519-zebra->serde                      1.0.136                        1.0.137  1.0.137                          Normal       ---
ed25519-zebra->serde                      1.0.136                        1.0.137  Removed                          Normal       ---
ed25519-zebra->sha2                       0.9.9                          ---      Removed                          Normal       ---
ed25519-zebra->thiserror                  1.0.30                         1.0.31   1.0.31                           Normal       ---
ed25519-zebra->thiserror                  1.0.30                         1.0.31   Removed                          Normal       ---
elliptic-curve->crypto-bigint             0.2.11                         ---      0.3.2                            Normal       ---
elliptic-curve->crypto-bigint             0.2.11                         ---      Removed                          Normal       ---
elliptic-curve->ff                        0.10.1                         ---      0.11.1                           Normal       ---
elliptic-curve->ff                        0.10.1                         ---      Removed                          Normal       ---
elliptic-curve->generic-array             0.14.5                         ---      Removed                          Normal       ---
elliptic-curve->group                     0.10.0                         ---      0.11.0                           Normal       ---
elliptic-curve->group                     0.10.0                         ---      Removed                          Normal       ---
elliptic-curve->pkcs8                     0.7.6                          ---      Removed                          Normal       ---
elliptic-curve->rand_core                 0.6.3                          ---      Removed                          Normal       ---
elliptic-curve->subtle                    2.4.1                          ---      Removed                          Normal       ---
elliptic-curve->zeroize                   1.4.3                          ---      1.5.5                            Normal       ---
elliptic-curve->zeroize                   1.4.3                          ---      Removed                          Normal       ---
ff->rand_core                             0.6.3                          ---      Removed                          Normal       ---
ff->subtle                                2.4.1                          ---      Removed                          Normal       ---
generic-array->typenum                    1.15.0                         ---      Removed                          Normal       ---
generic-array->version_check              0.9.4                          ---      Removed                          Build        ---
getrandom->cfg-if                         1.0.0                          ---      Removed                          Normal       ---
getrandom->libc                           0.2.118                        0.2.125  0.2.125                          Normal       cfg(unix)
getrandom->libc                           0.2.118                        0.2.125  Removed                          Normal       cfg(unix)
getrandom->wasi                           0.10.2+wasi-snapshot-preview1  ---      Removed                          Normal       cfg(target_os =
"wasi")
getrandom->wasi                           0.9.0+wasi-snapshot-preview1   ---      0.10.2+wasi-snapshot-preview1    Normal       cfg(target_os =
"wasi")
getrandom->wasi                           0.9.0+wasi-snapshot-preview1   ---      Removed                          Normal       cfg(target_os =
"wasi")
group->ff                                 0.10.1                         ---      0.11.1                           Normal       ---
group->ff                                 0.10.1                         ---      Removed                          Normal       ---
group->rand_core                          0.6.3                          ---      Removed                          Normal       ---
group->subtle                             2.4.1                          ---      Removed                          Normal       ---
hmac->crypto-mac                          0.11.1                         ---      Removed                          Normal       ---
hmac->digest                              0.9.0                          ---      Removed                          Normal       ---
k256->cfg-if                              1.0.0                          ---      Removed                          Normal       ---
k256->ecdsa                               0.12.4                         ---      0.13.4                           Normal       ---
k256->ecdsa                               0.12.4                         ---      Removed                          Normal       ---
k256->elliptic-curve                      0.10.6                         ---      0.11.12                          Normal       ---
k256->elliptic-curve                      0.10.6                         ---      Removed                          Normal       ---
k256->sha2                                0.9.9                          ---      Removed                          Normal       ---
pkcs8->der                                0.4.5                          ---      Removed                          Normal       ---
pkcs8->spki                               0.4.1                          ---      Removed                          Normal       ---
proc-macro2->unicode-xid                  0.2.2                          0.2.3    0.2.3                            Normal       ---
proc-macro2->unicode-xid                  0.2.2                          0.2.3    Removed                          Normal       ---
quote->proc-macro2                        1.0.36                         1.0.38   1.0.38                           Normal       ---
quote->proc-macro2                        1.0.36                         1.0.38   Removed                          Normal       ---
rand_core->getrandom                      0.1.16                         ---      0.2.6                            Normal       ---
rand_core->getrandom                      0.1.16                         ---      Removed                          Normal       ---
rand_core->getrandom                      0.2.4                          0.2.6    0.2.6                            Normal       ---
rand_core->getrandom                      0.2.4                          0.2.6    Removed                          Normal       ---
schemars->dyn-clone                       1.0.4                          1.0.5    1.0.5                            Normal       ---
schemars->dyn-clone                       1.0.4                          1.0.5    Removed                          Normal       ---
schemars->schemars_derive                 0.8.8                          ---      Removed                          Normal       ---
schemars->serde                           1.0.136                        1.0.137  1.0.137                          Normal       ---
schemars->serde                           1.0.136                        1.0.137  Removed                          Normal       ---
schemars->serde_json                      1.0.79                         1.0.81   1.0.81                           Normal       ---
schemars->serde_json                      1.0.79                         1.0.81   Removed                          Normal       ---
schemars_derive->proc-macro2              1.0.36                         1.0.38   1.0.38                           Normal       ---
schemars_derive->proc-macro2              1.0.36                         1.0.38   Removed                          Normal       ---
schemars_derive->quote                    1.0.15                         1.0.18   1.0.18                           Normal       ---
schemars_derive->quote                    1.0.15                         1.0.18   Removed                          Normal       ---
schemars_derive->serde_derive_internals   0.25.0                         ---      Removed                          Normal       ---
schemars_derive->syn                      1.0.86                         1.0.94   1.0.94                           Normal       ---
schemars_derive->syn                      1.0.86                         1.0.94   Removed                          Normal       ---
serde                                     1.0.136                        1.0.137  1.0.137                          Normal       ---
serde->serde_derive                       1.0.136                        1.0.137  1.0.137                          Normal       ---
serde->serde_derive                       1.0.136                        1.0.137  Removed                          Normal       ---
serde-json-wasm->serde                    1.0.136                        1.0.137  1.0.137                          Normal       ---
serde-json-wasm->serde                    1.0.136                        1.0.137  Removed                          Normal       ---
serde_derive->proc-macro2                 1.0.36                         1.0.38   1.0.38                           Normal       ---
serde_derive->proc-macro2                 1.0.36                         1.0.38   Removed                          Normal       ---
serde_derive->quote                       1.0.15                         1.0.18   1.0.18                           Normal       ---
serde_derive->quote                       1.0.15                         1.0.18   Removed                          Normal       ---
serde_derive->syn                         1.0.86                         1.0.94   1.0.94                           Normal       ---
serde_derive->syn                         1.0.86                         1.0.94   Removed                          Normal       ---
serde_derive_internals->proc-macro2       1.0.36                         1.0.38   1.0.38                           Normal       ---
serde_derive_internals->proc-macro2       1.0.36                         1.0.38   Removed                          Normal       ---
serde_derive_internals->quote             1.0.15                         1.0.18   1.0.18                           Normal       ---
serde_derive_internals->quote             1.0.15                         1.0.18   Removed                          Normal       ---
serde_derive_internals->syn               1.0.86                         1.0.94   1.0.94                           Normal       ---
serde_derive_internals->syn               1.0.86                         1.0.94   Removed                          Normal       ---
serde_json->itoa                          1.0.1                          1.0.2    1.0.2                            Normal       ---
serde_json->itoa                          1.0.1                          1.0.2    Removed                          Normal       ---
serde_json->ryu                           1.0.9                          1.0.10   1.0.10                           Normal       ---
serde_json->ryu                           1.0.9                          1.0.10   Removed                          Normal       ---
serde_json->serde                         1.0.136                        1.0.137  1.0.137                          Normal       ---
serde_json->serde                         1.0.136                        1.0.137  Removed                          Normal       ---
sha2->block-buffer                        0.9.0                          ---      Removed                          Normal       ---
sha2->cfg-if                              1.0.0                          ---      Removed                          Normal       ---
sha2->cpufeatures                         0.2.1                          0.2.2    0.2.2                            Normal
cfg(any(target_arch =
                                                                                                                    "aarch64",
target_arch =
                                                                                                                    "x86_64",
target_arch =
                                                                                                                    "x86"))
```

sha2->cpufeatures	0.2.1	0.2.2	Removed	Normal	cfg(any(target_arch = "aarch64", target_arch = "x86_64", target_arch = "x86"))
sha2->digest	0.9.0	---	Removed	Normal	---
sha2->opaque-debug	0.3.0	---	Removed	Normal	---
signature->digest	0.9.0	---	Removed	Normal	---
signature->rand_core	0.6.3	---	Removed	Normal	---
spki->der	0.4.5	---	Removed	Normal	---
syn->proc-macro2	1.0.36	1.0.38	1.0.38	Normal	---
syn->proc-macro2	1.0.36	1.0.38	Removed	Normal	---
syn->quote	1.0.15	1.0.18	1.0.18	Normal	---
syn->quote	1.0.15	1.0.18	Removed	Normal	---
syn->unicode-xid	0.2.2	0.2.3	0.2.3	Normal	---
syn->unicode-xid	0.2.2	0.2.3	Removed	Normal	---
thiserror	1.0.30	1.0.31	1.0.31	Normal	---
thiserror->thiserror-impl	1.0.30	1.0.31	1.0.31	Normal	---
thiserror->thiserror-impl	1.0.30	1.0.31	Removed	Normal	---
thiserror-impl->proc-macro2	1.0.36	1.0.38	1.0.38	Normal	---
thiserror-impl->proc-macro2	1.0.36	1.0.38	Removed	Normal	---
thiserror-impl->quote	1.0.15	1.0.18	1.0.18	Normal	---
thiserror-impl->quote	1.0.15	1.0.18	Removed	Normal	---
thiserror-impl->syn	1.0.86	1.0.94	1.0.94	Normal	---
thiserror-impl->syn	1.0.86	1.0.94	Removed	Normal	---
uint	0.9.1	---	0.9.3	Normal	---
uint->byteorder	1.4.3	---	Removed	Normal	---
uint->crunchy	0.2.2	---	Removed	Normal	---
uint->hex	0.4.3	---	Removed	Normal	---
uint->static_assertions	1.1.0	---	Removed	Normal	---