What Is Claimed Is:

1. A reading method of a storage device including at least one non-volatile memory device and a controller configured to control the at least one non-volatile memory device, the method comprising:

performing, by the at least one non-volatile memory device, a first on-chip valley search (OVS) operation in response to a read command from the controller;

receiving, by the controller, first detection information of the first OVS operation in response to a specific command from the controller;

updating, by the controller, a second table with a first offset corresponding to the first detection information using a first table; and

performing, by the at least one non-volatile memory device, a second OVS operation using the second table in response to a reissued read command from the controller, wherein:

the first table includes the first offset according to a detection case for each state, and

the second table includes a second offset of a read level for each state.

2. The method of claim 1, wherein the performing of the first OVS operation includes:

entering an OVS recovery code when read data is uncorrectable;

determining whether to perform a history read operation; and

performing an OVS sensing operation and a normal read operation when the history read operation is not performed.

3. The method of claim 2, wherein the performing of the first OVS operation further includes performing the OVS sensing operation and the history read operation.

4. The method of any one of claims 1 to 3, further comprising:

receiving, by the controller, data read in the first OVS operation; and

determining, by the controller, whether the read data is error-correctable, wherein

the second OVS operation is performed when the read data is uncorrectable.

5. The method of any one of claims 1 to 4, further including determining, by the controller, whether the first OVS operation is passed after the updating the second table with the first offset.

6. The method of claim 5, further comprising determining whether to allow the second OVS operation when the first OVS operation is not passed.

7. The method of claim 6, wherein the determining whether to allow the second OVS operation includes determining whether the number of times the OVS operation is performed exceeds a reference value.

8. The method of claim 6 or claim 7, further comprising performing, by the at least one non-volatile memory device, an off-chip valley search operation when the second OVS operation is not allowed.

9. The method of claim 1, wherein each of the performing of the first OVS operation and the performing of the second OVS operation includes:

determining whether the detection case according to the OVS sensing operation is an edge case;

changing a read level to a changed read level when the detection case is the edge case; and

performing a next OVS sensing operation using the changed read level.

10. The method of any one of claims 1 to 9, further comprising:

receiving, by the controller, second detection information of the second OVS operation in response to the specific command; and

updating, by the controller, the second table with a second offset corresponding to the second detection information using the first table.

11. A reading method of a storage device including at least one non-volatile memory device and a controller configured to control the at least one non-volatile memory device, the method comprising:

determining whether to perform a history read operation or a normal read operation according to a read request;

performing the history read operation or the normal read operation;

determining whether data read in the history read operation or the normal read operation is uncorrectable;

entering an on-chip valley search (OVS) recovery code when the read data is uncorrectable;

performing a first OVS operation with reference to a read level in the OVS recovery code;

determining a first detection case according to the first OVS operation;

determining whether the first OVS operation is passed;

determining whether to allow a second OVS operation when the first OVS operation is not passed;

changing the read level to a changed read level when the second OVS operation is allowed;

performing the second OVS operation with reference to the changed read level; and

determining a second detection case according to the second OVS operation;

determining whether the second OVS operation is passed;

receiving, from the at least one non-volatile memory device, detection information corresponding to a corresponding detection case in response to a specific command from the controller when the first OVS operation is passed or the second OVS operation is passed;

determining a first offset corresponding to the detection information using an OVS table; and

updating a history read table with the first offset corresponding to the corresponding detection case,

wherein the OVS table includes the first offset according to a detection case for each state, and the history read table includes a second offset of the read level for each state.

12. The method of claim 11, wherein the changing of the read level includes changing, by the at least one non-volatile memory device, the read level by the first offset corresponding to the first detection case.

13. The method of claim 11, wherein the changing the read level includes changing, by the controller, the read level by the first offset corresponding to the first detection case.

14. A non-volatile memory device comprising:

a memory cell array including a plurality of memory blocks having a plurality of memory cells connected to a plurality of wordlines and a plurality of bitlines;

a row decoder configured to select one of the plurality of memory blocks in response to an address;

a voltage generator configured to provide wordline voltages corresponding to a selected wordline and unselected wordlines from among the plurality of wordlines;

page buffers connected to the plurality of bitlines and configured to read data from memory cells connected to the selected wordline of a selected memory block among the plurality of memory blocks; and

a control logic configured to control the row decoder, the voltage generator, and the page buffers, wherein:

the control logic includes an OVS circuit configured to receive a command latch enable (CLE) signal, an address latch enable (ALE) signal, a chip enable (CE) signal, a write enable (WE) signal, a read enable (RE) signal, and a DQS signal through control pins and to perform an on-chip valley search (OVS) by latching a command or an

address at an edge of the WE signal according to the CLE signal and the ALE signal, and

the OVS circuit performs a first OVS operation with reference to a read level, receives first detection information of the first OVS operation, updates a second table with a first offset corresponding to the first detection information using a first table, and performs a second OVS operation with reference to a changed read level using the second table, and

wherein the first table includes the first offset according to a detection case for each state, and the second table includes a second offset of the read level for each state.

15. The non-volatile memory device of claim 14, wherein the OVS circuit determines whether a detection case according to the first OVS operation is an edge case.

16. The non-volatile memory device of claim 15, wherein when the detection case is not the edge case, the OVS circuit outputs data according to the first OVS operation and outputs detection information corresponding to the detection case in response to a specific command.

17. The non-volatile memory device of claim 15 or claim 16, wherein when the detection case is the edge case, the OVS circuit changes the read level and performs the second OVS operation with reference to the changed read level.

18. The non-volatile memory device of any one of claims 14 to 17, wherein the number of times the OVS operation is performed in response to one read command does not exceed a reference value.