Vasopressin response to changes in plasma osmolality

In the simplest way, vasopressin adjusts renal water excretion in response to changes in extracellular fluid tonicity.

The main stimulus for vasopressin release is an increase in plasma tonicity.

Increased Plasma tonicity by 1%
Threshold value = 280 mOsm/Kg

Beyond 290 mOsm/Kg, water resorption is maximal

Even though vasopressin concentration continues to rise, at a serum concentration of 5pM the maximal urinary concentration is achieved, and no greater water retention is possible. After this point, defence of osmolality must be accomplished by increasing water intake, rather than preventing water loss.

In summary:
- Vasopressin release occurs at osmolality over 280 mOsm/Kg
- 1% changes in osmolality cause a change in vasopressin release
- The scale of vasopressin response is linear, in proportion to the osmolality
- Beyond an osmolality of 290, increasing vasopressin levels do not increase water reabsorption
- Beyond an osmolality of 290, water intake via thirst is the only way to defend against hyperosmolarity.

Thirst is the response to osmolality over 290 mOsm/Kg; It increases water intake once maximal renal vasopressin effect is achieved, thereby diluting the ECF.

This is the conscious sensation of the physiological urge to drink. It originates in the thirst centre of the hypothalamus.

People's normal daily water intake is not motivated by this sort of thirst; rather, most of your daily water is consumed socially, not because your osmolality is deranged. This is so-called hedonistic drinking.

From Ganong's Review of Medical Physiology 23rd edition, Vanders Renal Physiology 7th edition, West's Respiratory Physiology: the Essentials, as well as public works by the eminent Dr Kerry Brandis to whom I owe much of the inspiration for my shambolic efforts at self-education.