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HOME EQUITY CONVERSION MORTGAGE  
PAYMENT CALCULATION FORMULAS

In this appendix the algebraic formulas necessary to calculate payments to borrowers are given.

1. Principal Limit:

$$PL\{\text{Sub } k\} = PL\{\text{Sub } 1\} (1 + i)^{\{\text{Sup } (k-1)\}}$$

where

$PL\{\text{Sub } k\}$  is the principal limit in the  $k$ th month of the loan, and this principal limit is constant during the entire month,

$PL\{\text{Sub } 1\}$  is the principal limit at origination and is obtained by multiplying the principal limit factor provided by the Secretary by the maximum claim amount. (NOTE: For loans originated mid-month, the principal limit at origination is the principal limit for the first month of the loan, and is considered to have been in effect since the first day of the origination month), and

$i$  is the monthly compounding rate calculated as one twelfth of the sum of the expected average mortgage rate and the annual MIP rate (0.5 percent). For example, if the expected average mortgage rate is 10 percent, then  $i = (0.10 + 0.005)/12 = 0.00875$ . The compounding rate does not change during the life of the loan. NOTE: The principal limit is not subject to per diem compounding when mid-month computations are made.

2. Servicing Fee Set Aside:

$$S\{\text{Sub } k\} = \text{FEE} \times [(1+i)^{\{\text{Sup } (m+1)\}} - (1+i)] / [i \times (1+i)^{\{\text{Sup } m\}}],$$

where

$S\{\text{Sub } k\}$  is the set aside of principal limit required in the  $k$ th month of the loan for future payment of flat monthly loan servicing fees from the borrower's account, and this amount is constant for the entire month,

$m$  is the number of remaining months that the servicing fee could be collected, i.e., the remaining term on a tenure mortgage in the  $k$ th month of the loan:

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$$m = 12 \times (100 - \text{Borrower's Initial Age}) - k + 1, \text{ and}$$

FEE is the monthly loan servicing fee charged to the borrower's account. NOTE: If loan servicing charges are included in the interest rate and thereby paid as a percentage of the outstanding loan balance, then FEE is zero, and the calculation of  $S\{\text{Sub } k\}$  results in a zero set aside amount for all months. In all other cases, the servicing set aside,  $S\{\text{Sub } k\}$ , decreases as  $k$  increases, reaching zero for  $k = 12 \times (100 - \text{Age})$ .

### 3. Net Principal Limit:

$$\text{NPL}\{\text{Sub } k\} = \max [ 0, \text{PL}\{\text{Sub } k\} - S\{\text{Sub } k\} - B\{\text{Sub } k\} ],$$

where

$\text{NPL}\{\text{Sub } k\}$  is the net principal limit in the  $k$ th month of the loan,

$\text{PL}\{\text{Sub } k\}$  is the principal limit in the  $k$ th month from equation (1),

$S\{\text{Sub } k\}$  is the servicing set aside of principal limit from equation (2), and

$B\{\text{Sub } k\}$  is the total loan balance in the  $k$ th month, including payments to or on behalf of the borrower (whether scheduled or unscheduled), interest at the note rate, and MIP. NOTE:  $B$  is subject to per diem interest and MIP for mid-month calculation. At origination, i.e.,  $k = 1$ , the balance is the initial loan balance.

### 4. Principal Limit for Line of Credit:

$$\text{LOC}\{\text{Sub } k\} = \text{LOC}\{\text{Sub } 1\} (1 + i)^{\{\text{Sup } (k-1)\}},$$

where

$\text{LOC}\{\text{Sub } k\}$  is the principal limit for the line of credit in the  $k$ th month of the loan, and this principal limit is constant for the entire month (no per diem compounding for mid-month calculations), and

$\text{LOC}\{\text{Sub } 1\}$  is the principal limit established for the line of credit at origination, and must not exceed  $\text{NPL}\{\text{Sub } 1\}$  from equation (3). (NOTE:  $\text{LOC}\{\text{Sub } 1\}$  must be large enough to cover required set asides for repairs after closing and first year taxes and insurance, if any.)

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5. Available Line of Credit:

$$ALC\{\text{Sub } k\} = \max [ 0, LOC\{\text{Sub } k\} - D\{\text{Sub } k\} - R - T ],$$

where

ALC{Sub k} is the available line of credit in the kth month of the loan,

LOC{Sub k} is the principal limit of the line of credit from equation (4),

D{Sub k} is the portion of the loan balance attributable to the line of credit in the kth month (i.e., the sum of all drawdowns on the line of credit since origination plus interest at the note rate plus MIP. NOTE: The initial balance at origination, scheduled monthly payments, and servicing fees, if any, are not included in D, and that D is subject to per diem interest and MIP if mid-month calculations are made), and

R and T are the fixed set-aside amounts for repairs after closing and first year taxes and insurance as required. NOTE: Once repairs and first year taxes and insurance have been paid, R and T become zero for the remainder of the loan.

6. Scheduled Monthly Payments:

$$P = ( NPL\{\text{Sub } k\} - [ LOC\{\text{Sub } k\} - D\{\text{Sub } k\} ] ) \times (1 + i)^{\text{Sup } m} \times i / [(1 + i)^{\text{Sup } (m-1)} - (1 + i)],$$

where

P is the maximum scheduled monthly payment to the borrower commencing in month k and continuing for a term of m months,

[For a tenure payment, m is calculated to be:

$$m = 12 \times (100 - \text{Borrower's Initial Age}) - k + 1.$$

For any term less than that of a tenure payment, the borrower may choose the number of months, m. For calculation of monthly payment amount at loan origination, set k = 1 in all equations. Note that for mid-month originations, the first payment will be made in the second month. For payment plan modifications, principal limits and loan balances will

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be calculated as of the effective date of the modification, which is the date of first modified payment.]

$NPL\{\text{Sub } k\}$  is the net principal limit from equation (3),

$LOC\{\text{Sub } k\}$  is the principal limit of the line of credit from equation (4), and

$D\{\text{Sub } k\}$  is the portion of the loan balance attributable to the line of credit as defined in equation (5). Note that the difference ( $LOC\{\text{Sub } k\} - D\{\text{Sub } k\}$ ) may be interpreted as the net principal limit of the line of credit, and ( $NPL\{\text{Sub } k\} - [LOC\{\text{Sub } k\} - D\{\text{Sub } k\}]$ ) may be interpreted as net principal limit available for calculating monthly payments.

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